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Agriculture.

THE COTTON-GROWING INDUSTRY IN TEXAS, U.S. AMERICA.

The Hon. W. H. Barnes, Acting Premier of Queensland, has received from the Prime Minister of the Commonwealth of Australia, the Hon. J. Cook, an interesting letter written by the Acting Consul at Galveston, Texas, U.S.A., in answer to inquiries made by the Dominions Commission in regard to the cotton-growing industry in the United States. This letter, a copy of which has been forwarded to the Hon. the Minister for Agriculture, Queensland, gives valuable particulars concerning the industry in Texas, and, as will be seen, the system adopted in that State synchronises very closely with the methods in vogue in Queensland when cotton was largely grown throughout the Southern districts. It will be noted that the average yield in Texas for 1912 was 600 lb. of seed cotton, yielding 206 lb. of lint, and that the average yield per acre during the previous ten years was, in seed cotton, 500 lb., and 164 lb. of lint. In the annual report of the Under Secretary for Agriculture for 1912-13, the total area under cotton cultivation in Queensland was shown to be 441 acres, which yielded 150,414 lb. of seed cotton, or an average of 341 lb. per acre. This average, however, does not really represent the capabilities of the soil, neither does it represent the results of well-cultivated areas. In many districts yields of over 1,000 lb. of seed cotton per acre were harvested. Yet, if two farmers plant 10 acres of cotton and one of them takes every care of his plants from sowing to picking, and his neighbour allows his field to be smothered with weeds, and his consequently scanty crop to be left to itself to be damaged by wind, weather, and pests, the average crop of the two is set down as possibly less than half the yield had both growers taken equal care to

ensure a good crop. It has been repeatedly shown that, in our cotton districts, crops well cared for have yielded from 1,000 up to 2,000 lb. of Upland seed cotton. It is the same with all crops—cereals, roots, or fruit. The careless farmer's returns are boxed with those of the careful man, with the result that it goes forth to the world that our land is only capable of producing crops which, if every field produced on a similar scale, would be unremunerative. The same argument doubtless applies to the average crops in the United States. If the return on every cotton farm were only 500 lb. of seed cotton, selling at, say, 1½d. to 2d. per lb., the monetary return to the farmer would only be from £3 2s. 6d. to £4 3s. 4d. per acre, from which must be deducted £1 5s. per acre for cultivating and 15s. 7½d. for picking, or £2 0s. 7½d.; not to mention cartage, bales, and incidental labour. This would leave the grower a net return at the outside of from £1 1s. 10½d. to £2 2s. 8½d. per acre, irrespective of the incidental expenses. That this is not the true state of the cotton industry is shown by the fact that the United States farmers produce some 12,000,000 bales of ginned cotton per annum, which they would not do if their returns were as here reckoned. Corn and hogs would be more profitable. The same argument will apply to cotton-growing in Queensland, where the conditions of culture are, as stated, practically identical with those in practice in Texas—*i.e.*, large plantations, although experimentally tried in this State many years ago, were found to be impracticable, and hence the industry was carried on in exactly the same manner as described in paragraphs 14 and 15 of the attached letter. That is to say, that the whole of the cotton grown and exported from Queensland has been the produce of small farms, the areas ranging from 5 to 40 acres. We specially draw attention to these two paragraphs, since it is to the small farmer, and not to the big plantation owner, that the success of the industry was, is, and will be due.

Following is the letter to which reference has been made: —

DOMINIONS ROYAL COMMISSION.

British Consulate,

Galveston, 11th July, 1913.

SIR,—With reference to your despatch of the 14th ultimo, enclosing a list of questions concerning the cotton-growing industry in the State of Texas, I have the honour to submit herewith answers to the questions propounded.

I am, &c.,

(Sgd.) S. W. BARNES,

Acting Consul.

The Secretary, Dominions Royal Commission.

Enclosure.

LIST OF QUESTIONS AND ANSWERS ON THE COTTON-GROWING INDUSTRY IN THE STATE OF TEXAS.

1. What varieties of cotton are grown in Texas?—The King's Improved, Prolific, Russell's, Bohemian, Rowden, and Triumph

(Meade's). These are all classed as "moderate staple" cotton. The two last-named varieties are sown more frequently than any other sorts.

2. What was the average yield per acre in 1912 of (*a*) seed cotton and (*b*) lint?—The average yield per acre in 1912 of seed cotton was 600 lb. and 206 lb. in lint. In this connection it should, however, be mentioned that 1912 was an exceptionally good cotton-yielding year, and that the average yield per acre during the previous ten years was in seed cotton 500 lb. and 164 lb. in lint.

3. What is the usual cost of (*a*) cultivating and (*b*) picking of seed cotton per acre and per lb.?—The cost of preparing the land—that is, ploughing up the old crop, planting the seed, and cultivating the growing crop until maturity—is, approximately 6 dollars (£1 5s.) per acre, and 75 cents (3s. 1½d.) per 100 lb. is paid for picking cotton.

4. What are, roughly, the proportions of white and black labour employed in Texas in (*a*) cultivating and (*b*) picking?—The proportions of white and black labour employed both in the cultivation and picking of cotton are three-fourths white and one-fourth black labour. A large quantity of Mexicans are brought over the border every year to expedite the picking of cotton in Texas.

5. What, in each case, are the average wages paid for (*a*) cultivation and (*b*) picking?—The average wages paid the labourer for cultivating cotton are from 20 dollar (£4 3s. 4d.) to 25 dollars (£5 4s. 2d.) per month with board and lodging, or from 75 cents (3s. 1½d.) to 1 dollar (4s. 2d.) per day. These wages are paid both the white and black labourers and are maintained the year through. As previously stated, the rate paid both the white and black labourer for picking cotton is 75 cents (3s. 1½d.) per 100 lb. of cotton in the seed.

6. How do these wages compare with similar wages in other agricultural occupations?—The staple crop in Texas is cotton, and, although there are some farms in the State where grain and other crops are grown exclusive of cotton, the wages paid to the farm hands are about the same in respect to all crops cultivated.

7. Is female and child labour employed to any extent in (*a*) cultivating and (*b*) picking? If so, what are the wages usually paid to women and children—(*a*) white; (*b*), black?—Women and children are employed in the cultivation as well as in the picking of cotton. The wages paid to the former are but little less than those paid to the men, and no difference is made in regard to the colour of the worker. Children are paid the same price for picking cotton as are the men and women, and the same wages in proportion to their strength and ability to cultivate the crops.

8. Can figures be given as to the relative efficiency of white and black labour in (*a*) cultivating and (*b*) picking, to be measured by the number of pounds of seed cotton picked per day?—No figures are obtainable that would give the relative efficiency between the white and black labour in the cultivation and picking of cotton. The hot sun in the middle of the day gives the black man less inconvenience than it does the white man, but comparing their work at the end of the day, results prove that

the best black labourer is not a better worker than the best white labourer, and taking the average of the two colours it will probably be found that there are fewer trifling white men than black.

9. Is white labour showing a tendency to replace black labour in cultivating or picking?—The number of white labourers is increasing more rapidly than the black.

10. Is a picking machine in use? If so, of what kind is it, and to what extent has it been a success?—A few cotton-picking machines have been used experimentally. It is reported that quite a number of the Price-Campbell cotton-picking machines (the sale of which is controlled by Mr. Theodore Price, of New York City) were sold last year, and will be used the coming season. It is thought that the cotton-picking machine will soon be looked upon as a necessity on the large cotton plantations, where generally the supply of pickers is not equal to the demand.

11. How many weeks does picking take?—The length of time required for picking cotton depends almost entirely upon the conditions of the weather during the time the cotton plant is making cotton. With favourable weather, from the time the first bolls open until a frost kills the plant, cotton is being produced from the same stalks. With a mild cotton season, it is gathered from the same stalk from July until December, and on rare occasions until January and February.

12. Is it hurried to any extent through fear of frost?—No; the cotton plant alone is injured by the frost; the ungathered cotton is not injured except by very heavy rains and high winds.

13. Is "family labour" employed at all in cultivating and picking, or is it the case in the United States of America, as it is said to be the case in Australia, that the farmer considers cotton-picking a "mean" occupation, and does not like his family to engage in it?—All the members of the family of the farmer who is in moderate circumstances assist in the cultivation and gathering of the crops on the farm, and the cotton crop is no exception to this rule. More hands are needed to pick cotton than to cultivate it, and the farmer looks to outside help to pick his cotton. Men and boys, and sometimes whole families, leave the small towns and go into the country during the cotton-picking time. Neighbours help neighbours in this particular work more than in any other. Cotton-picking parties are made up similar to sheep-shearing parties in Australia. The average picker can pick from 100 lb. to 200 lb. during the day, but as much as 500 lb. have been picked during the same time where all the conditions were favourable.

14. Is cotton cultivated on a small scale tending to replace cultivation on large plantations; and, if so, is it combined with other forms of agriculture—*e.g.*, dairying, or stock or sheep raising?—The great bulk of the cotton raised in Texas is grown on comparatively small farms; big plantations are largely of the past, owing to the inability of the farmer to procure enough pickers to pick his cotton at maturity. Successful cotton-picking machines may reinstate the large farms. Cotton cultivation in this State leads all other forms of agriculture combined, and the farmer generally plants most of his arable land in cotton because

of all crops it is the most reliable one from which he can raise money for his immediate use. Dairying, stock, sheep, and poultry raising are small issues compared to the growing of cotton.

15. Is cotton grown at all as a by-product on farms?—"Diversification of crops" has been for many years drilled into the minds of the Texas farmer as being the means whereby he can "best raise the mortgage on his land"; but, in spite of all the literature that has been printed and distributed among them, the farmer still holds to his cotton crop as pre-eminently the surest way of making money. There are but few farms on which cotton is grown as a by-product.

16. Have you any observation to make as to the possibility of growing cotton under the following conditions:—(*a*), Good soil; (*b*), good climate; (*c*), only white labour?—The possibility of growing cotton in good soil with only white labour has in Texas proved to be quite successful. There are small towns and farming sections in Texas where the black man or woman is not allowed to apply for work, and the "Darkie"—so long associated in the South with the cotton-fields and for many years considered indispensable to the farmer who grows cotton—is gradually passing. The change can be looked for in the use of modern machinery on the farm, thus making the labour lighter and less burdensome; by means of instructions on farming, now being sent out gratuitously to the farmer through the "Texas International Congress," offering money prizes for the best yield per acre of the various crops not only to the farmer himself but to his sons; free lectures given every year at the Agricultural and Mechanical College of Texas on all subjects pertaining to farming; State instructors travelling through the country visiting the farms and giving advice as to what lands need in the way of fertilisers, &c.; and teaching the farmer that he need no longer look upon his calling as one of constant toil and labour, but by employing the most up-to-date methods of getting the largest yield out of his land, farming becomes a legitimate, scientific, and healthful way of making a good living.

BRITISH COTTON-GROWING ASSOCIATION AND AUSTRALIA.

As a result of inquiries made by the Dominion Royal Commission as to the possibilities of cotton-growing in Australia and subsequent correspondence and a conference between members of the commission and representatives of the British Cotton-growing Association, the Government of the Commonwealth of Australia, the Government of Queensland, and the Imperial Institute, a letter on the subject was sent recently by the chairman of the association to the Dominions Royal Commission.

The letter mentions first how anxious and willing the association is to prove definitely whether cotton can be grown on a commercial basis in any part of Australia. It is pointed out, however, that, in regard to their supplying a large sum of money for the necessary experimental work, the fact that the association has already spent over £170,000 on

such work prevents their being able to afford to devote any large sum of money towards carrying out the work under immediate consideration. It is suggested to the Queensland Government that, in the first instance, an agriculturist with good practical knowledge of cotton-growing should be engaged for a period of three years, and he might with advantage be attached to one of the local Agricultural Departments. He should conduct experiments preferably on experimental plots situated on estates. This is often done in the United States and in Egypt, and it is generally arranged that the farmer shall be guaranteed a minimum crop. To assist in these experiments, the association would contribute the sum of £100 per annum towards their cost, for a period of three years, dating from 1st July, 1914.

It is essential to recognise that the question of the seed which is to be used for sowing is the most vital factor. "No matter how good the soil, or how favourable the climatic conditions, or how excellent the cultivation, unless the seed is sound and well matured and of a variety suitable to the district, the result must be failure." The danger of growing several varieties in one district is also pointed out. For example, if cotton 1½ in. long and worth, say, 10d. per lb., is mixed with cotton 1 in. in length and worth, say, 7d. per lb., it is probable that its value will be less than 6½d. per lb. For this reason, amongst many others of equal importance, it is urged that the seed supply should be left in the hands of the Government, and that no one should be allowed either to import or distribute seed except under license from the Government. Further, the ginning and the baling of the cotton should be under Government control, for it is just as dangerous to mix different growths together in the ginning and baling as it is to so mix the seed.

As regards the type of cotton which should be cultivated, only experience will enable one to decide definitely which type will be most suitable. Sea Island and perennial cottons are to be ruled out at once* Indian cotton is of very low value and would be useless. Egyptian does well under irrigation, but is hardly to be recommended as a rain crop.

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*We find that the reasons given by Mr. J. Arthur Hutton, chairman of the British Cotton-growing Association, for barring the cultivation of Sea Island and perennial cottons in Queensland are well worthy of consideration. He says:—"As to the type of cotton which should be grown (Mr. Hutton says) only experience will enable one to decide definitely which type will be most suitable. I may, however, state at once that there are two types which should not be encouraged—viz., Sea Island and perennial cotton. The market for Sea Island cotton is a very small one, and is already very fully supplied from the United States and the West Indies. As to perennial types, they may do well enough on a small scale; but, speaking from experience spread all over the world, in the long run their cultivation is not a profitable one, and the type of cotton, though suitable for mixing with wool, is not suitable for cotton-spinning. There is also the great disadvantage that they give every facility for the spread of cotton pests and diseases. The modern practice is to cultivate all cotton as an annual and to have all the plants destroyed at the end of each season, so as to prevent them acting as a bridge to convey the pests from one season to another. For the same reason 'ratooning' or pruning back the plants for a second season's growth, should be absolutely forbidden, for there is the additional disadvantage that the fibre deteriorates year by year."

In support of the above, the report of Messrs. Henry W. Frost and Co. as to Sea Island Cotton in the Southern States of America shows that the total exports of Sea Island Cotton from the United States to Liverpool, Manchester, and Havre up to 15th November, 1913, were 3,220, 3,672, and 1,662 bales respectively. The prices ranged from 12d. to 14¾d. per lb. c.i.f.—Ed. "Q.A.J."

As regards American, the shorter staple varieties, owing to their low value, are not likely to prove profitable. It must be remembered that, although it has been proved experimentally that cotton can be grown in Queensland,† the legislation against the importation of black labour makes the scale of wages so high that it is necessary to grow only the best types of high value, if the cultivation is to be a success commercially. It would therefore appear that some of the high-class varieties of American Upland cotton would be most likely to answer purposes in Queensland.

After consideration of the whole question, the committee of the association authorised the following offer to the commission:—

As already stated, £100 per annum will be contributed if the Government decide to undertake the experimental work suggested above. The association will also supply, free of charge, small quantities of seed for experimental purposes; they will report on samples, superintend sales, keep separate accounts for each shipper, and superintend the remittance of the proceeds. As well as this, the association will pay the ocean freight, and will superintend the insurance of the cotton; the association will, when required, make arrangements for financing cotton or seed by accepting bills drawn on shipment. The association will, furthermore, supply ginning and other machinery, baling material, and other stores on easy terms of payment, and will give the buyer full advantage of all cash and trade discounts. Finally, the association will guarantee a minimum price for Australian cotton in Liverpool or London of 6½d. per lb., less insurance, port, and other charges (which amount to about ½d. per lb.) for all cotton forwarded to them for sale and which shall have been produced from an annual variety grown from seed issued by the Government, and which shall be shipped in a clean and merchantable condition. Any surplus which may be obtained over the abovementioned price of 6½d. per lb. will be remitted to the planter. It is stipulated that this offer does not apply to any cotton grown from perennial varieties or from ratooned cotton.—"Agricultural News," Barbados.

COTTON-PICKING IN QUEENSLAND.

In the report issued by the Dominions Commission on the cotton industry in Queensland, details are given of the proposal of the British Cotton-growing Association to establish cotton-growing, which the Commonwealth and Queensland Governments have accepted. The Commissioners state that black labour is absolutely unnecessary for the successful cultivation of cotton, and that 75 per cent. of the labour in the cotton-fields of Texas (U.S.A.) is white. We have persistently pointed out that in Queensland cotton in its palmiest as well as in its decadent cotton-growing days, has been grown, picked, ginned, and prepared for market entirely by white labour, and in this matter we are quite in accord with

† Cotton-growing in Queensland has long ago passed the experimental stages, as witness the exports of Queensland cotton between the years 1866 and 1873, when the exported cotton rose to 2,602,100 in 1871.—Ed. "Q.A.J."

the dictum of the Commissioners. But the report further says:—"It is estimated that picking in Australia will cost 3d. per lb., whereas in the Southern States of America it is more." As a matter of fact, the cost of hand-picking cotton in America is 1 dollar 10 cents per 100 lb., or about ½d. per lb. To this we reply that if the cost of merely picking the cotton in Queensland amounted to 3d. per lb., there could be no possibility of establishing the industry, seeing that Upland seed cotton is sold to-day at 2d. to 2½d. per lb.—*i.e.*, from ½d. to 1d. less than the alleged cost of picking, which can be shown to have never amounted to more than ½d. per lb. in this State. Young pickers can average at cotton picking from 60 to 80 lb. per day, and adults can pick from 100 to 200 lb. per day, one grower, an American, in the Central District reaching 250 lb. per day. If the price of picking were 3d. per lb. the latter would be able to make £3 2s. 6d. per day or £18 15s. per week! A boy or girl of twelve years of age paid at the same rate would make from 15s. to £1 per day. It is therefore clear that either a printer's error has occurred in the published report or that the cabled news is incorrect, or that the Commissioners have confused the value of seed cotton with the cost of picking. A 1,000-lb. crop of cotton in the seed is worth at present rates, say 2d. per lb. or 2½d. for the best samples of Upland. This gives the producer from £8 6s. 8d. to £10 1s. 8d. for his crop; but, according to the report of the Commissioners, the cost of picking this 1,000 lb. of seed cotton would be £12 10s., resulting in a dead loss of from £3 3s. 4d. to £2 8s. 4d., without taking into consideration the primary cost of planting, subsequent cultivation, cartage, baling, &c.

At ½d. per lb. for picking, young pickers can earn in, say, six to seven hours, without distressing themselves, from 2s. 6d. to 3s. 4d. per day, or 15s. to £1 per week, whilst expert adult pickers can earn from 8s. 4d. to 10s. 5d. per day, or from £2 10s. to £3 2s. 6d. per week.

Another view of the matter is, that with ginned cotton at the present English market price of 6¾d. per lb., the 1,000 lb. of seed cotton yielding 400 lb. of lint are worth £11 5s. Deduct cost of ginning (£1 0s. 10d.) and £12 10s. for picking (at 3d. per lb., as per report), irrespective of other charges, the cost amounts to £13 10s. 10d. for a return of £11 5s. The absurdity is at once apparent.

WHEAT EXPERIMENTS AT ROMA—SEASON, 1913.

[CONTINUED.]

CULTURAL.

Inaugurated in 1907, in an endeavour to ascertain the most desirable system for the farmer to adopt in order to obtain the maximum returns for his labours from the land in this district.

As mentioned previously in connection with these experiments, erosion, situation, and differences in the character of the soil has influenced the yields of some blocks, so much so as to prohibit the results from being used for comparative purposes. Notwithstanding this, a good

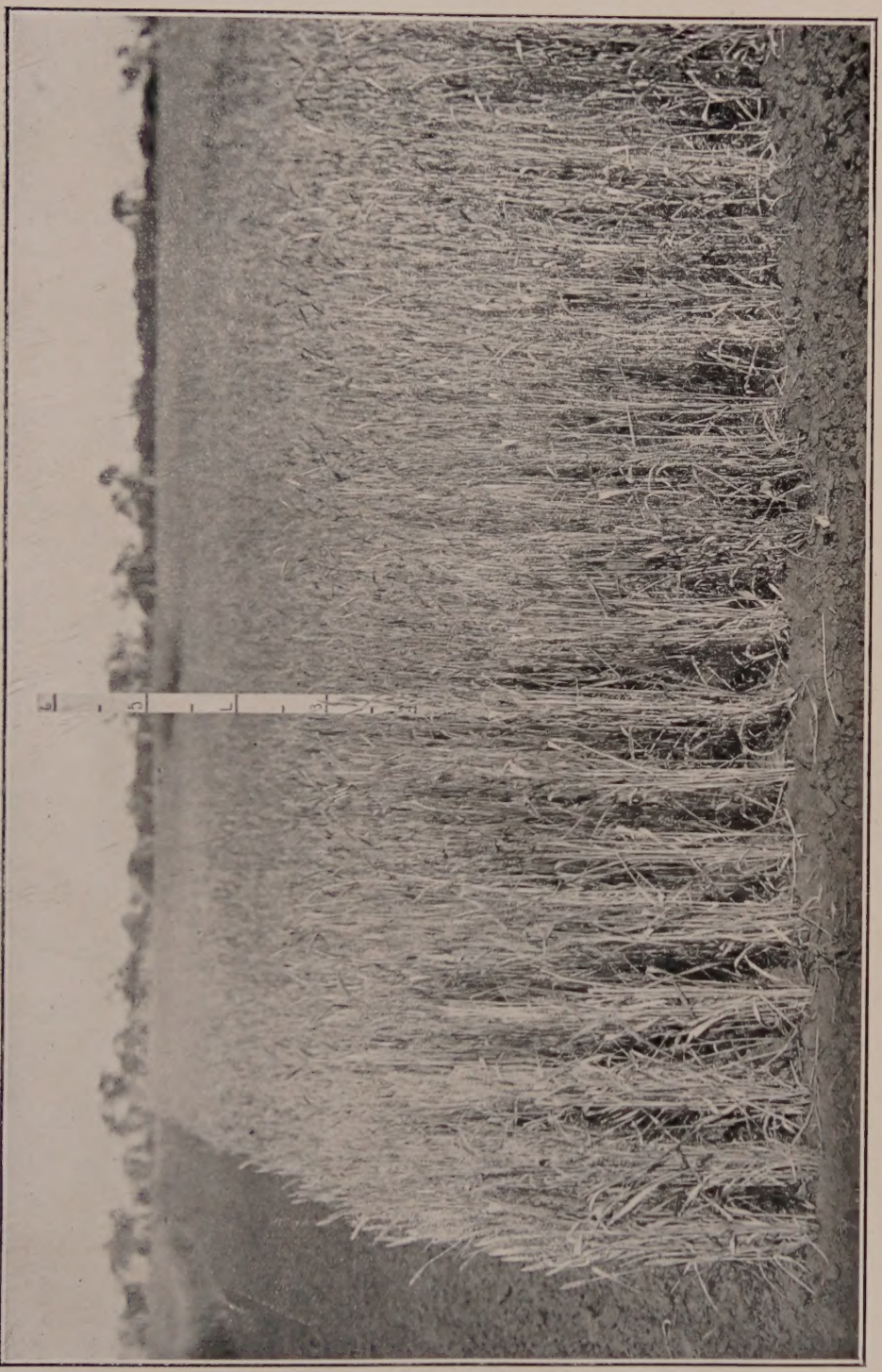


PLATE 17.—BUNGE No. 1, UNMANURED, ROMA STATE FARM.

deal of information has been acquired, and it has been proved conclusively that in seasons such as have been experienced since the plots were laid down, providing systematic operations are practised, wheat-growing can be carried out successfully on soils even where only shallow working is permissible.

The results obtained last season and the average yields to date, &c., are as follow:—

Variety wheat: Bunge No. 1.

Quantity: ½ bushel to acre.

Treatment seed: Bluestone and lime.

Sown: 3rd week May.

Peeping: 30th May.

Germination: Even and good.

Harvested: 3rd week October.

Manure applied: ½ cwt. super.; ¼ sulph. of potash.

Preparation seed bed: Once ploughed; twice cultivated; thrice harrowed.

Block.	Treatment.	Yield—1913.	Average.	Remarks, 1913.
1	Ploughed 4 in., rolled during growth	24·05	17·04	Height 2 ft. 6 in., even crop, thin.
2	Ploughed 4 in., harrowed once during growth	24·01	17·06	Height 2 ft. 6 in., even crop, thin.
3	Ploughed 4 in., harrowed twice during growth	25·04	16·06	Height 2 ft. 6 in., even crop, thin.
4	Ploughed 4 in., harrowed thrice during growth	26·05	18·09	Height 2 ft. 6 in. to 3 ft., patchy.
5	Ploughed 6 in., a little deeper every year; 4 in. first ploughing	28·05	19 04	Height 3 ft., even crop.
6	Ploughed 5 in., no after cultivation	27·03	18·09	Height 2 ft. 6 in. to 3 ft., uneven, frosted in places.
7	Ploughed 6 in., no after cultivation	26 81	20·03	Height 2 ft. 6 in. to 3 ft., uneven, frosted in places.
8	Ploughed 6 in., rolled during growth	24 68	20·05	Height 2 ft. 6 in. to 3 ft., uneven, frosted in places.
9	Ploughed 6 in., harrowed once during growth	27·05	22·05	Height 3 ft., more even than 6, 7, 8, frosted in places.
10	Ploughed 6 in., 40 lb. seed to acre	25·01	22·04	Height 3 ft., where not affected by trees on roadside, which reduced yield.
11	Ploughed 6 in., 18 lb. seed to acre	23·05	18·08	Height 2 ft. 6 in. to 3 ft., uneven, trees affected yield, ground badly scoured and broken, frosted slightly.
12	Ploughed 6 in., harrowed twice during growth	25·02	20·06	Height 2 ft. 6 in. to 3 ft., uneven, trees affected yield, ground badly scoured and broken, frosted slightly.
13	Ploughed 6 in., drilled in 4 in. approx.	27·05	20·01	Height 2 ft. 6 in. to 3 ft., uneven, ground not so broken, not so much frosted.
14	Ploughed 6 in., seed drilled in 3 in. approx.	26·08	19·04	Height 2 ft. 6 in. to 3 ft., uneven, patchy, ground broken shallow.
15	Ploughed 7 in. approx.	24·04	19·01	Height 2 ft. 6 in. to 3 ft., uneven, patchy, ground broken shallow.
16	Ploughed 8 in. approx., rotation crop panicum	26·02	20·05	Height 2ft. 6 in. to 3 ft., uneven, patchy, ground broken shallow.
17	Ploughed 8 in., rotation crop pumpkins	23·09	20·05	Height 2 ft. 6 in. to 3 ft., infested with couch (introduced), which spreads during summer cultivation.
18	Ploughed 8 in., rotation crop, rape	22·00	17·09	Height 2 ft. 6 in., thin, ground bakes.
19	Ploughed 8 in., rotation crop cowpea	22·06	18·06	Height 2 ft. 6 in., thin, ground bakes.
20	Ploughed 8 in., bare fallow ...	21·01	18·00	Height 2 ft. 6 in., thin, ground bakes.

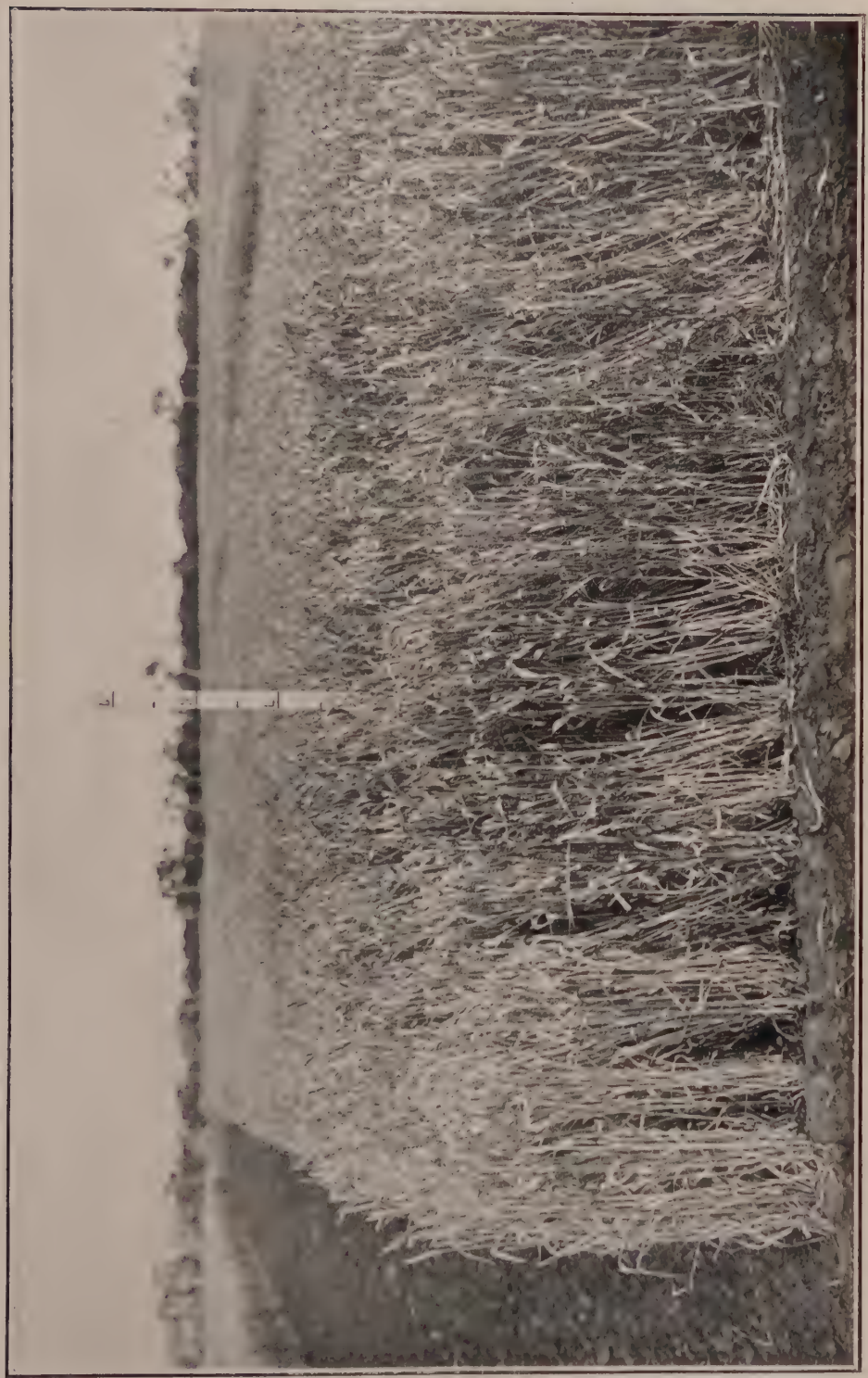


Plate 18.—Bunge No. 1, Stable-manured, Roma State Farm.

Blocks 1, 2, 3, 4, 18, 19, and 20 are situated on the highest ground, where the soil is an admixture of sand, clay, and loam, comparatively shallow, which runs together and sets on the surface, so that after once being wetted the physical condition is such as to preclude anything but a minimum amount of moisture penetrating it.

Soil on blocks 5, 6, 14, 15, 16, and 17 is slightly better, patches of sandy loam being met with. Blocks 7, 8, 9, and 10 are the most even so far as quality of soil, and are situated on the lowest ground. The effects of frosts were most apparent in these blocks. Blocks 11, 12, and 13 have been practically put out of commission through being situated on a slope over which all the water running off the other blocks has to pass.

THE PRICE-CAMPBELL COTTON-PICKING MACHINE.

In June and August, 1911, we drew attention to the probability of the vexed question of cheaply harvesting our cotton crops by means of the invention of what was, and still is, said to be a perfected cotton-picking machine by Mr. Angus Campbell, of Texas, U.S.A., and we quoted "The World's Work" for December, 1910, to the following effect:—"The average field hand can pick between 200 and 250 lb. of seed cotton in a day, though fast pickers often get as much as 400 to 500 lb. The machine can cover 8 or 10 acres a day. In a good field it would pick 8,000 or 10,000 lb., and in a poorer field 4,000 to 5,000 lb. With it a man could go over a 40-acre farm twice in ten days and picking time would be the least busy time of the year."

Again quoting the "World's Work" on the questions as to whether it would pay the grower to have his cotton picked by the machine, and whether it would pay the machine owner to pick it at such a price as would enable the grower to realise a good profit from his crop, we wrote:—"As we took a 100-acre farm and a half bale (200 lb. lint, equal to 600-lb. seed cotton) crop as an example of the cost of picking the crop by machinery, we will consider the same area as being picked by hand. In twice picking by the former method, the cost is set down at £30 to pick 600 lb. seed cotton per acre on 100 acres; that is to say, that 60,000 lb. of cotton are picked for £30. By hand, the cost of picking in the United States is 1 dollar 10 cents per 100 lb., or about $1\frac{1}{2}$d. per lb. This is the price paid in Queensland. Hence 60,000 lb. would cost £125 to pick by hand, as against £30 by machine, not to speak of the vast saving of time and labour. The cotton-grower within reach of a machine would have nothing to do with this crop at picking time, and would, therefore, be at liberty to attend to other work, which, under the hand-picking system, would have to be neglected or additional labour would have to be employed. The capabilities of cotton-growing in Queensland are enormous, and the advent of this machine should prove an incentive to farmers all over the cotton districts to plant as many acres of cotton as possible, with a view to making the State what it can easily become—the greatest cotton-growing country in the world without employing a single coloured labourer."

PLATE 19.—BUNGE No. 1, GENERAL VIEW, CULTIVATION EXPERIMENTS

Since the above was written the Agent-General for Queensland, Sir Thomas Robinson, in response to a request from the Rockhampton Chamber of Commerce, obtained from the Executive Engineer in London a report on the working of the machine, which he was afforded an opportunity of witnessing in operation, and was satisfied that it could discriminate between ripe and unripe cotton-bolls, finger over the delicate plant, get the lint, and leave the rest unharmed. The exhibitors then stated that it was capable of "doing the work of fifty niggers."

Strange to say, although Mr. Price's assistant, who was conducting the demonstration, assured the Engineer that he would supply him with export prices in the course of a few days, the former suddenly went back to the United States. Later on, a letter was received by the Engineer from New York, signed by Mr. Price, in which he stated that he regretted to report that he was not yet in a position to name an export price on the machines, or to offer them for shipment abroad, as the inventors had all they could do to meet the American demand.

Thus, although apparently the machine does what is claimed for it, cotton-growers outside the United States will not be afforded an opportunity of purchasing one.

TIMES OF SUNRISE AND SUNSET AT BRISBANE—1914.

Date.	January.		February.		March.		April.	
	Rises.	Sets.	Rises.	Sets	Rises.	Sets.	Rises.	Sets.
1	4·56	6·46	5·21	6·42	5·41	6·20	5·57	5·47
2	4·57	6·46	5·21	6·42	5·41	6·19	5·58	5·46
3	4·58	6·46	5 22	6·41	5·42	6·18	5·58	5·45
4	4·59	6·46	5·23	6·41	5·42	6·17	5·59	5 43
5	4·59	6·46	5 24	6·40	5·43	6·16	5·59	5·42
6	5·0	6·47	5·24	6·39	5·44	6·15	6·0	5·41
7	5·1	6·47	5·25	6·39	5·44	6·14	6 0	5·40
8	5·1	6·47	5·26	6·38	5·45	6·13	6·1	5·39
9	5·2	6·47	5·27	6·37	5·45	6·12	6·1	5·38
10	5 3	6·47	5 28	6 37	5·46	6·11	6·2	5·37
11	5·4	6·47	5·28	6·36	5·46	6·10	6·2	5·36
12	5 4	6·47	5·29	6·35	5·47	6·9	6·3	5 35
13	5·5	6·47	5·30	6 35	5·47	6·8	6·4	5·34
14	5·6	6·47	5·31	6 34	5·48	6·7	6·4	5·33
15	5·7	6·47	5·31	6·33	5·49	6·6	6·5	5·31
16	5·8	6·47	5·32	6·32	5·49	6·4	6 5	5·30
17	5·9	6·47	5·33	6·31	5·50	6·3	6·6	5 29
18	5·9	6·47	5·33	6·30	5·50	6·2	6·6	5·29
19	5·10	6·47	5·34	6 30	5·51	6·1	6·7	5·28
20	5·11	6.47	5·35	6 29	5·51	6·0	6·7	5·27
21	5·12	6·46	5·35	6·28	5·52	5·59	6·8	5·26
22	5·13	6·46	5·36	6·27	5·52	5·58	6·8	5 25
23	5·13	6·46	5·37	6·26	5·53	5·57	6·9	5·24
24	5·14	6·45	5·37	6·25	5·53	5·56	6·9	5·23
25	5·15	6 45	5·38	6·24	5·54	5·54	6·10	5 22
26	5·16	6·45	5·39	6·23	5·54	5·53	6·10	5·21
27	5·16	6 44	5·39	6·22	5·55	5·52	6·11	5·20
28	5·17	6·44	5·40	6·21	5·55	5·51	6·11	5·19
29	5·18	6·43	...	...	5·56	5·50	6·12	5·18
30	5·19	6 43	...	...	5·56	5·49	6·12	5·18
31	5·20	6·43	...	...	5·57	5·48	...	...

Phases of the Moon.			H.	M.	
4 Jan.	☾	First Quarter	11	9	p.m.
12 „	○	Full Moon	3	9	„
19 „	☽	Last Quarter	10	30	a.m.
26 „	●	New Moon	4	34	p.m.
3 Feb.	☾	First Quarter	8	33	p.m.
11 „	○	Full Moon	3	35	a.m.
17 „	☽	Last Quarter	7	23	p.m.
25 „	●	New Moon	10	2	a.m.
5 Mar.	☾	First Quarter	3	3	p.m.
12 „	○	Full Moon	2	18	„
19 „	☽	Last Quarter	5	39	a.m.
27 „	●	New Moon	4	9	a.m.
4 Apr.	☾	First Quarter	5	41	a.m.
10 „	○	Full Moon	11	28	p.m.
17 „	☽	Last Quarter	5	52	„
25 „	●	New Moon	9	22	„

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MONTH OF JANUARY, 1914.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Madame Melba	Holstein	10 Nov., 1913	1,140	3·9	49·61	
Lady Loch...	Ayrshire	31 Aug. ,,	978	4·2	46·01	
Miss Bell ...	Jersey	25 Sept. ,,	711	5·6	45·20	
Lavinia's Pride	Ayrshire	11 Dec. ,,	951	3·9	41·38	
Bee	Jersey	7 July ,,	657	5·4	40·20	
Glen ...	Shorthorn... ...	27 Oct. ,,	975	3·6	39·00	
Rosine ...	Ayrshire	27 Nov. ,,	833	4·1	38·20	
Miss Lark ..	,, ...	27 Dec. ,,	840	4·0	37·54	
Burton's Lady	Shorthorn... ...	23 June ,,	714	4·7	37·78	
Nellie II. ...	,, ...	5 June ,,	904	3·7	37·21	
Bluebelle ...	Jersey	13 July ,,	726	4·5	36·72	
Pauline ...	Shorthorn... ...	8 Oct. ,,	853	3·8	36·11	
Butter ...	,, ...	27 Sept. ,,	870	3·6	34·80	
Burton's Lily	,, ...	29 Dec. ,,	823	3·7	33·88	
Lady Margaret	Ayrshire	20 Mar. ,,	621	4·8	33·60	
Miss Melba	Holstein	22 Jan. ,,	693	4·2	32·60	
Honeycombe	Shorthorn... ...	7 June ,,	688	4·2	32·36	
Sweet Meadows	Jersey	20 Aug. ,,	432	6·8	32·29	
Auntie ...	Ayrshire	15 July ,,	700	4·1	32·11	
Queen Kate	,, ...	4 Jan. ,,	885	3·2	31·23	
Cocoatina ...	Jersey	19 May ,,	491	5·4	30·04	
Countess of Brunswick	Shorthorn... ...	22 July ,,	630	4·1	28·89	
Bella ...	Ayrshire	16 Dec. ,,	697	3·7	28·68	
Gem	Shorthorn... ...	8 Aug. ,,	665	3·8	28·16	
Silver Nell ...	,, ...	26 Sept. ,,	684	3·7	28·15	
Daisy ...	Holstein	14 Feb. ,,	804	3·0	26·48	
Lennie ...	Ayrshire	1 Sept. ,,	731	3·2	25·78	
Lonesome ..	,, ...	26 Oct. ,,	684	3·4	25·74	
Miss Morton	Shorthorn	14 Oct. ,,	675	3·3	24·61	
Miss Edition	Jersey	25 Sept. ,,	612	3·6	24·48	
Gretchen ...	Holstein	19 June ,,	552	3·9	24·01	
Lady Brunswick	Shorthorn... ...	27 Oct. ,,	557	3·7	22·91	
Lilley ..	,, ...	2 June ,,	478	4·1	21·92	
Doreen ...	,, ...	3 Nov. ,,	503	3·9	21·89	
Miss Jean ..	Ayrshire	13 Jan. ,,	504	3·8	21·33	
St. Elizabeth	Jersey	19 June ,,	295	6·1	20·24	

Fed on natural grasses, with an added ration of 40 lb. of sorghum ensilage per head per day.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, JANUARY, 1914.

Four thousand four hundred and fifty-three eggs were laid during the month, an average of 111·3 per pen. Moritz Bros. again win the monthly prize, with 143 eggs. The following are the individual records :—

Competitors.	Breed.	Jan.	Total.
A. H. Padman, S.A.	White Leghorns	133	1,333
Moritz Bros., S.A.	Do.	143	1,323
J. R. Wilson	Do.	113	1,316
T. Fannin	Do. (No. 2)	126	1,292
Loloma Poultry Farm, N.S.W.	Do.	119	1,290
Range Poultry Farm	Do.	115	1,252
O.K. Poultry Yards	Do.	95	1,244
R. Burns	Black Orpingtons (No. 2)	123	1,216
E. A. Smith	White Leghorns (No. 2)	111	1,214
T. D. England	Do.	104	1,208
J. F. Coates	Do.	119	1,202
J. Zahl	Do.	120	1,187
H. Tappenden	Do.	115	1,173
S. E. Sharpe	Do.	110	1,172
F. McCauley	Do.	110	1,167
A. T. Coomber	Do.	109	1,166
R. Burns	Black Orpingtons (No. 1)	95	1,166
W. D. Bradburne, N.S.W.	White Leghorns	126	1,165
J. McKay	Do.	114	1,153
Mrs. Munro	Do.	118	1,152
E. A. Smith	Do. (No. 1)	115	1,148
Cowan Bros., N.S.W.	Do.	106	1,146
Doyle Bros., N.S.W.	Do.	97	1,136
Mrs. Sprengel, N.S.W.	Do.	127	1,131
Yangarella Poultry Farm	Do.	118	1,125
H. Hammill, N.S.W.	Do.	116	1,121
A. F. Camkin, N.S.W.	Do.	117	1,120
T. Fanning	Do. (No. 1)	128	1,083
J. Murchie	Brown Leghorns	121	1,074
Mrs. Craig	White Leghorns	131	1,072
R. Jobbling, N.S.W.	Do.	97	1,071
D. Grant	Do.	91	1,066
C. Leach, N.S.W.	Do.	109	1,062
J. Archibald, N.S.W.	Do.	92	1,057
J. Gosley	Do.	99	1,045
A. Schbrowski	Brown Leghorns	77	1,005
T. Stephens, N.S.W.	White Leghorns	87	995
Mrs. Bieber	Brown Leghorns	104	994
A. C. Collis, N.S.W.	White Leghorns	110	992
J. Andersen, Victoria	Red Sussex	93	995
Totals		4,453	45,789

KILLING FOWLS BY DISLOCATION OF THE NECK.

To kill fowls by the dislocation of the neck, take the bird by the legs in the left hand, catching the extreme ends of the wings in the same hand, to prevent the fowl fluttering; then grip the bird's head between the first and second fingers of the hand, the palm of the hand being uppermost, and press the thumb on top of the head, the back of the fowl being upwards. The legs should be held against the left hip of the operator, and the head laid against the right thigh, near the knee. The fowl should then be quickly and firmly extended, at the same time pressing the thumb and bending the head suddenly backwards, so that the neck will be dislocated just below the junction with the head; death will immediately ensue. Muscular contraction will take place for a few minutes, so it is best not to place the fowl on the ground, as thus it will damage its flesh. Some poulterers, in addition to dislocating the fowl's neck, run a knife through the neck just below the ear, so as to allow the bird to bleed, and to render its flesh whiter. But if the fowl be hung by its feet for a minute or two directly after the vertical column is broken, the blood will drain to the head and neck, and there will be no necessity to use a knife. It is, of course, of great importance that the blood be thoroughly drained from the body, otherwise the flesh will present a reddish appearance, which gives the carcase a common look, and detracts from its value in the market.—"Garden and Field."

TO CLEAN IVORY.

1. The curators of the anatomical museum of the "Jardin des Plantes," France, have found that spirits of turpentine is very efficacious in removing the disagreeable odour and fatty emanation of bones or ivory, while it leaves them beautifully bleached. The articles should be exposed in the fluid for three or four days in the sun, or a little longer if in the shade. They should rest upon strips of zinc, so as to be a fraction of an inch above the bottom of the glass vessel employed. The turpentine acts as an oxidising agent, and the product of the combustion is an acid liquor, which sinks to the bottom, and strongly attacks the ivory if allowed to touch it. 2. Make a thick paste of common whiting in a saucer. Brush well with a toothbrush into the carved work. Brush well out with plenty of clean water. Dry gently near the fire. Finish with a clean, dry, hard brush, adding one or two drops (not more) of alcohol. 3. Mix about a tablespoonful of oxalic acid in ½ pint of boiling water. Wet the ivory over first with water, then with a toothbrush apply the acid, doing one side at a time, and rinsing, and finally drying it in a cloth before the fire, but not too close.

State Farms.

KAMERUNGA STATE NURSERY.

Since the heavy rainfall of January (28.97 in.) and that of the three last weeks of December (13.59) the manager, Mr. C. Wood, reports that it has been arduous work to keep growing crops clean, but owing to the porosity of the soil and the occurrence of ten fine days between the rains, it was possible to get through so much weeds by horse-hoe and hand that nearly all the crops planted in December were coming on well. A number of young coffee plants, mangoes, and other trees, both fruit and shade, were successfully planted out. The newly imported Teff grass (*Eragrostis Abyssinnica*), a small plot of which was planted on 29th December, had attained a height of from 12 to 16 inches, and was showing signs of flowering. The seed must have been of good quality and probably all germinated as the grass came up too thickly. Mr. Wood considers that from its appearance it will make good hay, when the wet weather takes up and the grass makes a taller and stronger growth.

Some rice which was imported from French West Africa, and said to be perennial, had germinated, although only a small percentage, but as far as grain is concerned, it does not appear to be of much value, but if, as reported, it proves to be perennial, it should be very useful as a fodder.

BUNGEWORGORAI—ROMA.

The manager, Mr. R. E. Soutter, reports for the month of January exceptionally hot weather, the maximum temperature being 109 degrees F., with an average of 96.3 F.; minimum, 57 degrees F., average, 70.2 F. The rainfall was very scant, there having been only five falls totalling .90 in.; the total for the seven months ending 31st January amounted to 5.60 in. The dry weather militated against first-class work in preparing the land for the wheat crop of 1914, the greater portion of the ploughed land turning up very lumpy to the desired depth, but in good condition to derive the maximum benefit from heavy rains. During the last fortnight of the month 30 acres were turned over, which is about half of what could have been done were the ground in suitable condition and the weather cooler. The December sowings of sorghum and panicum were destroyed by the extremely dry, hot weather, the light rains wilting the seed. Maize on fallow land is reported as holding out well, but that sown on land previously cropped was not in such good condition, and even with rain was expected to give only a poor crop for silage purposes.

Cowpeas which were thoroughly established prior to the last rain, were growing luxuriantly. There is no doubt about the extreme hardiness of this crop and its ability to thrive under conditions fatal to others

with respect to lack of moisture and extreme heat. The same may be said of Soya bean, and Teff grass, which, the manager says, can thrive on a minimum amount of rain during growth providing there is moisture in the soil, having a better root system than the common annual grasses. Crossbred grasses—*i.e.*, Rhodes with Native grasses—have come into ear, and it is hoped that the seed will ripen in time to raise the F.2 generation. Types of these ears will, if possible, be arranged for display at the next Exhibition at Bowen Park.

From the general report on the various crops, we learn that the weather has been ideal for the vineyards, and that it was expected that, given fair conditions during the first fortnight of February, the grape crop will have been harvested without mishap. In the orchard, the lemons were shedding their fruit in large quantities; but, if rain were to fall shortly, the oranges and mandarins would still recover. As regards the stock, the horses and cattle look exceptionally well, considering the state of the pastures. The prickly pear is being cleared off, and advantage had been taken of the dry state of the weather to collect and burn all the logs and fallen branches in the swamp, these being a menace to live stock when covered by water.

WARREN.

The weather during the past month has been most trying. Scorching winds and promises of storms have been the order of the day since 1st February.

The district has a droughty appearance, and it seems as if our little locality has been forgotten when the seasonable rains were given this year. Crops which looked well at the beginning of the month are now in much need of moisture.

The work at this farm during the past month has been:—The cutting and carting of 35 acres of lucerne; this was saved in good order, and is stored in stacks. Land was prepared for potatoes, lucerne, and cereals. We have also disced and harrowed the lucerne paddocks since carting. The orchard has been ploughed, and land prepared for the removal of some of the fruit trees.

The small falls of rain which fell on 22nd January (0·25), 24th (0·2), and 28th (0·48)—total 0·75—were only sufficient to give the weeds a start. This necessitated a lot of chipping of weeds in the maize crops.

The plot of Teff grass, sown as an experiment, was completely destroyed by the hot winds and dry weather, while the Rhodes grass alongside is green and growing. The rice plot is also completely gone.

With regard to maize, I notice that the white varieties are holding their own far better than the yellow and red, but they are all in need of rain at present.

The Manchurian millet has only attained a height of about 18 in. this season, but is keeping nice and green.

KAIRI.

The manager's report on this farm for the month of January shows that in consequence of heavy rains which fell during thirteen days of the month, alternating with warm, bright weather, growing conditions were ideal. Grass was in superabundance, and stock all in the pink of condition. The maize crop was doing well, in spite of the depredations of wallabies; the maize-breeding plots were thriving, whilst cowpeas and other small crops round the homestead were also making good progress. Grass-planting had been begun on No. 4 clearing, but was not being pushed until clover seed arrived to sow with it.

With the advent of the young grass the dairy cows improved wonderfully, and more increase was to be expected than occurred at the end of last year. The natural increase of stock for the month was one colt foal from "Flower," and five males and three females from the common cattle. The cream returns were steadily mounting up. The want of the necessary dairy buildings, yards, &c., has been a considerable handicap, but good progress was being made with them, and it was expected that the milking-shed would be in use in about a fortnight from the date of the manager's report. Two young Jersey bulls had been sold, and one had been delivered to the purchaser. A sow received from Gatton College had given a litter of five pigs, all of which had been sold.

A CORRECTION.

In the report of the Manager of the Kamerunga State Nursery for January, the non-running legumas were given as: Poona Cowpea, Black and Yellow Pigeon Pea (*Phaseolus Max.* and *P. Mungo*).

The brackets give the impression that the enclosed botanical names are the names of the Black and Yellow Pigeon Pea, which is incorrect. Commas instead of brackets would have shown what was intended, and that was, that Pigeon Pea *and* Phaseolus max., and P. Mungo were meant.

The botanical name of Pigeon pea is "*Cajanus indica.*"

THE GIANT HEVEA.

In the Acre territory, it is said, there is a specimen of the *Hevea brasiliensis* which measures 25 ft. in circumference. This tree holds the record of the Amazon Valley, both for size and yield. It is reported to give a revenue of about £432 a year,* and is the sole support of a family of seven, but this is probably an exaggeration, as with rubber at 3s. a lb. £432 a year represents an output of nearly 3,000 lb.—a tall order. The Rubber Defence superintendent has ordered it to be photographed with the family assembled beneath it.—"The Rubber World."

* This estimate may have been made when rubber was bringing 10s. per lb.—[Ed. "Q.A.J."]

The Orchard.

BUDDING THE MANGO.

By G. WILLIAMS, Cairns.

Some fifteen years since, plate budding as a means of propagating mangoes was brought to public notice by Mr. Horace Knight, who had devoted considerable time and attention to the improvement of the quality of this fruit in the Central district. The system had much to recommend it, mainly in respect of adaptability to working over partially developed trees which on attaining fructification were not up to expectations—a frequent experience with seedling trees. It did not, however, for various reasons, commend itself for application to young trees such as sent out by nurserymen, and has not supplanted inarching. The attention requisite in connection with inarching can only be compensated by increased charge for plants, consequently that of worked mango trees has remained comparatively high—generally considered prohibitive. It is to be deprecated that propagation (other than by raising from seeds) of mangoes and other Northern fruits which have been improved by cultivation and selection, has received so little attention in this part of the North—from Cairns to Cooktown—where the quality and variety show unmistakable deterioration. The fact that trees or plants are most readily propagated in such districts wherein they thrive most luxuriantly would not appear to have received any consideration, otherwise it is difficult to account for the fact of absolutely nothing being accomplished where it would be expected that some result would be shown.

The early mango crop of Cooktown, Port Douglas, and Cairns, in fair seasons, is fit to place on Southern markets when these are practically depleted, and though high prices are obtained for earliest shipments from the former port, the average quality can only be classed as most inferior, and what should, to these places, be a profitable export, is, under present circumstances, a poor and hazardous one. On the lines of past experience, it is evident that supplies of worked trees for the North must continue to be drawn from Southern nurseries (in any case even the buds of varieties of requisite quality are unobtainable locally). Still, it is quite likely that results of propagation by budding in the ordinary manner will not be by any means so successful as in the North.

Experiments conducted locally during last year prove conclusively that mango plants can be budded as successfully in early stages as any other type of fruit tree—citrus for instance—concerning which very erroneous impressions had prevailed. The directions published in the "Queensland Agricultural Journal" (May, 1913) for budding citrus trees, apply also, in most details to mangoes, excepting that further development of stock may advantageously be allowed. Excellent results have been obtained from one and two year old seedlings, ordinary shield

buds being inserted in the usual manner, just as the terminals of stock are breaking into growth. It would be unreasonable to anticipate success at any other stage, on account of the successive periods of growth being frequent, and these of but short duration. Best results are obtained where buds for insertion are plump and well developed. Such buds are not characteristic of mango growth, but are readily obtained by cutting back by an inch or two (or more where required) the extremities of small branches from which it is proposed to take the buds; this being done a week or two before they are required for use. The actual time required can only be gauged by immediate local circumstances. The fact of buds being well developed admits of speedy attachment to the stock, so essential to success where growth is characterised by rapid cessation.

The most favourable time for the operation is during the warmer months, and, if followed immediately by heavy rains, results are poor, consequently, a moderately dry time should be chosen, the growth in stock being maintained by watering.

NEW CITRUS TREES FROM CHINA.

One of the most remarkable of the wild species of the genus Citrus is definitely described for the first time in the "Journal of Agricultural Research," vol. I., No. 1.

The reader may remember that the question of wild citrus species was dealt with in the last issue of the "Agricultural News," Barbados, and the present account forms, therefore, an interesting and important continuation of the subject.

The species under consideration has been named *Citrus Ichangensis*, Swingle. As far as is known, this plant is native farther north than any other evergreen species of citrus, only the deciduous *C. trifoliata* having a more northerly range. Besides having the most northerly range of any known evergreen species of citrus, it occurs at the highest altitudes reported for any other wild species of the genus.

C. Ichangensis is cultivated in China in the vicinity of Ichang; and it bears a very large lemon-like fruit that is of sufficiently good quality to cause it to be shipped to markets several hundred miles distant.

In the space of this article it would not be possible to reproduce in full Swingle's description of the species, but it may be noted that the species differs from its congeners in having very large thick seeds and slender leaves four to six times longer than broad, with very large winged petioles often as large or larger than the blade. It differs from *Citrus histrix*, DC., in having oblong rather than triangular winged petioles and much larger flowers with conate stamens. The bulky seeds of *Citrus Ichangensis* with their large brown caps and thickly formed cotyledons are not at all unlike those of the African species of hard-shelled citrus fruits belonging to the genera Balsamo-citrus and Aeglopsis.

A wild species of citrus—collected by Hooker and Thompson, in 1850, amongst the Khasi Hills, in Assam—has been described by Swingle,

as a sub-species, namely, *Citrus Ichangensis latipes*, Swingle. It differs from *C. Ichangensis* in having the leaves more variable in size and shape with the tops acute, not caudate, the flowers in few-flowered (three to five) panicles instead of solitary, and the fruits oblate instead of prolate spheroidal in shape. The fact that Hooker and Thompson called this plant a wild orange is additional evidence that the lemon-like appearance of the Chinese form is a constant sub-specific character.

POSSIBLE USES OF THE SPECIES.

The large size of the seeds makes it probable that *Citrus Ichangensis* will produce vigorous seedlings, and hence it is likely to be of value as a stock on which to graft other citrus fruits. The numerous large seeds, however, possess the drawback of greatly reducing the proportion of juice because of the space they take up. Since the plant is a native of China and Assam, and very hardy, its suitability for growth in the Southern States is practically a foregone conclusion, and there is every probability that this species will play a great part in the development of citrus cultivation in America. In conclusion it may be pointed out that the discovery of *C. Ichangensis* in a part of China as accessible as Ichang is a further proof of the rich harvest of new species of plants that awaits the botanist and agriculturist in China.

In connection with the above account, attention may be called to an article in the "American Breeders' Magazine" (July-September, 1913), dealing with *Cudrinia tricuspidata*, a representative of the natural order Moraceæ, and recently introduced to the United States from China. Its fruit, although small, is sweet and edible, and because of its hardiness, the shrub can probably be grown in the southern half of the United States. In China, the leaves are used for feeding silk worms at times when mulberry leaves are scarce. It is believed that it might be usefully employed for hedge purposes, and there appears to be little doubt that the fruit, if successfully crossed with the Osage orange, will provide a progeny yielding produce of great value as food for live stock.—"Agricultural News," Barbados.

CITRICULTURE IN THE PHILIPPINES.

FORMULAE FOR FUNGICIDES AND INSECTICIDES.

We are indebted to the author, Mr. P. J. Webster, Horticulturist in Charge of Linao Experimental Station, for a most interesting Bulletin (No. 27) on "Citriculture in the Philippines," in which he treats in a practical manner of the orange, pomelo, lime, mandarin, tangelo, &c., from propagation, transplanting, budding, grafting, nursery and field culture, manuring, harvesting, grading, packing, marketing, being the result of the author's experience for seven years in citrus culture in Florida, and two years in the Philippines. Although the treatise deals with the industry in those islands, the information it contains should be of general

interest to orange-growers in Queensland as well as in other tropical countries. The work is profusely illustrated throughout. A most valuable addendum is disease and insect pests of citrus trees, from which we take the liberty of extracting the various formulæ as here given:—

No. 1.—Bordeaux Mixture.

For Fungi.

Copper sulphate	1.5 kilograms (3½ lb.)
Unslaked lime	1 „ (2¼ lb.)
Water	100 litres (22 gals.)

Any of the non-arsenical sprays may be rendered effective against biting insects by adding to them Paris green or arsenate of lead at the same rate as recommended in formulas Nos. 10 and 11.

Place the copper sulphate in a feed sack and suspend it in a barrel containing 50 litres of water so that the sack is entirely covered by water. Slake the lime in another vessel and when slaked dilute to 50 litres. Before mixing stir the two solutions vigorously. Then dip a bucket from each solution and pour the two liquids together in a spray barrel, at the same time agitating the mixture vigorously. An excess of copper sulphate is injurious to the foliage, and before spraying the mixture should therefore be tested. This is done by inserting and holding in the mixture a clean steel blade for one or two minutes. If copper is deposited on the blade, more lime must be added. Use the mixture at once.

No. 2.—Carbolic-acid Solution.

For Footrot and Barkrot.

Crude carbolic acid	1 litre (1¾ pints)
Water	1 „ (1¾ pints)

Mix well and apply to the cut surface with a brush. Do not apply the mixture so heavily that it spreads over the live tissue or runs down over the sound portions of the bark, for the mixture is extremely poisonous and is deadly to all living plant tissues.

No. 3.—Good Caustic-Potash Whale-oil Soap.

For Scale and Sucking Insects.

Whale-oil soap ..	3-6 kilograms (6¾ to 13½ lb.)
Water	100 litres (22 gals.)

Dissolve the soap in cold water, strain and apply.

No. 4.—Kerosene Emulsion.

For Scale and Sucking Insects.

Kerosene	7.5 litres (6 quarts)
Hard soap	.25 kilogram (½ lb.)
Water	4 litres (3½ quarts)

Dissolve the soap in boiling water, and while still hot add the kerosene. Churn the liquid steadily for fifteen or twenty minutes by using a force pump, the liquid being pumped back into the vessel until it is emulsified. Sufficient hot water should be added to increase the

volume of solution to 16 litres (3 gals.). For spraying dilute at the rate of 1 litre (1¾ pints) of the stock solution to 15 litres (3½ gals.) of cold water.

No. 5.—Resin Wash.

For Scale and Sucking Insects.

Resin	9 kilograms (20½ lb.)
Caustic soda (98 per cent.)	2.25 „ (5 lb.)
Fish oil	1.5 litres (2½ pints)
Water	75 litres (15 gals.)

Pour 75 litres (16½ gals.) of water over the resin (which should be well broken up), caustic soda, and fish oil in a large iron kettle, and boil for three hours. Then add hot water from another boiler (which should be provided for this purpose) from time to time, and stir thoroughly until there are 190 litres (41½ gals.) of the solution. If desired for immediate use dilute each litre of the solution with 2 litres (3½ pints) of cold water before using. If kept as a stock solution, it should be diluted at the same ratio when used.

No. 6.—Self-boiled Lime-Sulphur Wash.

For Fungi and Scale.

Quicklime	3 kilograms (6¾ lb.)
Sulphur (flour or flowers)	3 „ (6¾ lb.)
Water	100 litres (22 gals.)

Place the lime in a barrel and pour on enough water to cover it. When the lime begins to slake, add the sulphur after running it through a sieve to break the lumps. Stir the mixture constantly and add water as needed to form a thick paste at first and then gradually a thin paste. The lime will supply enough heat to boil the mixture several minutes. As soon as the lime is well slaked, add water to cool the mixture and prevent further cooking. Strain carefully, working the sulphur through the strainer and dilute to 100 litres (22 gals.)

No. 7.—Soda-Sulphur Solution.

For Red Spider and Rust Mites.

Sulphur	12 kilograms (27 lb.)
Caustic soda (98 per cent.)	8 „ (18 lb.)
Water	10 litres (2 gals.)

In a wooden vessel make a thick paste by mixing the sulphur with the prescribed amount of water. Then add the caustic soda, mixing it thoroughly with the paste. As the mixture becomes heated gradually add water, stirring the solution thoroughly to prevent burning, until 75 litres (16½ gals.) is obtained.

In spraying for rust mites dilute at the rate of 1 to 2 litres (1¾ to 3½ pints) of the solution to 200 litres (43 gallons) of water. If the spray is employed against red spider use the same amount of the stock solution to 50 to 100 litres (11 to 22 gals.) of water.

No. 8.—Lime-Sulphur Dust.

For Rust Mite.

Sulphur	10 kilograms	(22¼ lb.)
Air-slaked lime	10 „	(22¼ lb.)

Mix the two ingredients well, and dust the trees twice a month until the insects disappear. It is best to apply the remedy in the morning while the plants are still wet with dew.

No. 9.—Kerosene-Carbolic Acid Emulsion.

For Ants and Mealy Bugs.

Kerosene	15 litres	(3 gals.)
Crude carbolic acid	.9 „	(1½ pints)
Soap	.5 kilogram	(1⅛ lb.)
Water	100 litres	(22 gals.)

Dissolve the soap in boiling water together with the carbolic acid, and while still hot add the kerosene. Churn the liquid steadily for fifteen or twenty minutes by the use of a force pump as in making kerosene emulsion. For spraying, dilute each litre of the emulsion with 18 litres (3¾ gals.) of water. In using this insecticide for ants spray the liquid into their nests.

No. 10.—Arsenate of Lead.

For Biting Insects.

Arsenate of lead	0.5-1 kilogram	(1⅛-2¼ lb.)
Quicklime	.5-1 „	(1⅛-2¼ lb.)
Water	100 liters	(21 gals.)

Slake the lime in a wooden vessel; dilute to 100 litres (22 gals.), and dissolve the arsenate of lead in the liquid.

No. 11.—Paris Green.

For Biting Insects.

Paris green	60-120 grams	(2 to 4 oz. troy)
Quicklime	0.5-1 kilogram	(1⅛-2¼ lb.)
Water	100 litres	(21 gals.)

Place the lime in a wooden vessel and slake; dilute to 100 litres (21 gals.) and add Paris green. London purple may be substituted for Paris green, and is then used at the same rate. Both these poisons, particularly the Paris green, have a tendency to settle, and the liquid should be kept in constant agitation during the spraying, else the spray from the bottom of the barrel may seriously damage the foliage, while the remainder is useless.

No. 12.—The Mally Fruit-fly Remedy.

For Fruit Flies.

Arsenate of lead	0.6 kilogram	(1⅓ lb.)
Sugar	7.5 „	(17 lb.)
Water	100 litres	(22 gals.)

Dissolve the arsenate of lead in a small quantity of water; dilute to 100 litres (22 gals.) and add sugar.

The first application should be made a month before the presence of the larvæ in the fruit is expected, and thereafter an application every ten to fourteen days is thought advisable, bearing in mind that the poisoned bait should be on the trees as long as the flies are present in the grove. About 1 to 1.5 litres (1¾ pints to 2½ pints) of spray is sufficient to a tree of 6 to 7.5 meters (19 to 24 ft.) spread. Apply the spray so that the liquid falls in small drops over and through the tree.*

GRAFTING THE PAPAW.

Much interest has of late been aroused amongst papaw-growers by the investigations of Mr. Ashton W. Gardner, Jamaica, who showed that the papaw could be grown from cuttings, and later by the successful experiments in grafting side-shoots of a tree which has had its top broken off, and hence sends out numerous shoots, on to a young seedling tree a couple of feet high. Before we heard of this we made an experiment in grafting a shoot from a female tree on to a young male tree which flowered when it was a little over two feet high. When young, the stem of the papaw is solid, and as it grows towards maturity the stem becomes hollow, and this led to experiments in "feeding" the tree per the hollow with sugar and water. Our experiment was made in precisely the manner as hereafter described in a reprint in the "Queensland Sugar Journal" of 8th January from a pamphlet issued in March, 1913, by the Agricultural Department of Washington, containing a paper by Mr. D. Fairchild, Agricultural Explorer in Charge of Foreign Seed and Plant Introduction, and E. Simmonds, Superintendent in Charge of the Sub-tropical Plant Introduction Field Station, on the above subject. Our experiment was successful up to a certain point, when the graft was accidentally pulled out after remaining healthy for over a fortnight, when it had apparently "taken."

The extract which was published in the "Sugar Journal" reads:—Investigations by Mr. Ashton W. Gardner, of Kingston, Jamaica, showed that the plant could be grown from cuttings, and the matter was taken up from this point of view by the Florida Field Station. But the process turned out to be so slow as to be of little value for conditions in South Florida.

With the discovery, however, of a practical method of rapid asexual propagation the papaw enters upon a new era of possibilities. It has been found by the writers that seeds of the papaya, when planted in the greenhouse in February, produce young seedlings large enough to graft some time in March; that these grafted trees, which can be grown in pots, when set out in the open ground in May or in the latter part of April, make an astonishing growth and come into bearing in November

* The British equivalents to the metric measurements are only approximate.—Ed. "Q.A.J."

or December, that they continue bearing throughout the following spring and summer, and, if it is advisable, can be left to bear fruit into the following autumn.

A single March-budded plant will bear from two to three dozen fruits during the following winter and spring, and these fruits will average from 2 to 3 lb. apiece, so that a single papaya tree should yield 48 to 72 lb. of fruit within 15 months. It has been found, however, that the papaya is a plant peculiarly subject to root-knot, caused by a species of nematode, and it is, therefore, important that it be handled as an annual tree crop, and be not planted year after year on the same ground, but in rotation with other crops.

METHOD OF GRAFTING EMPLOYED.

The method of grafting the papaya is so extremely simple that it seems remarkable that it was not discovered earlier. The difficulty

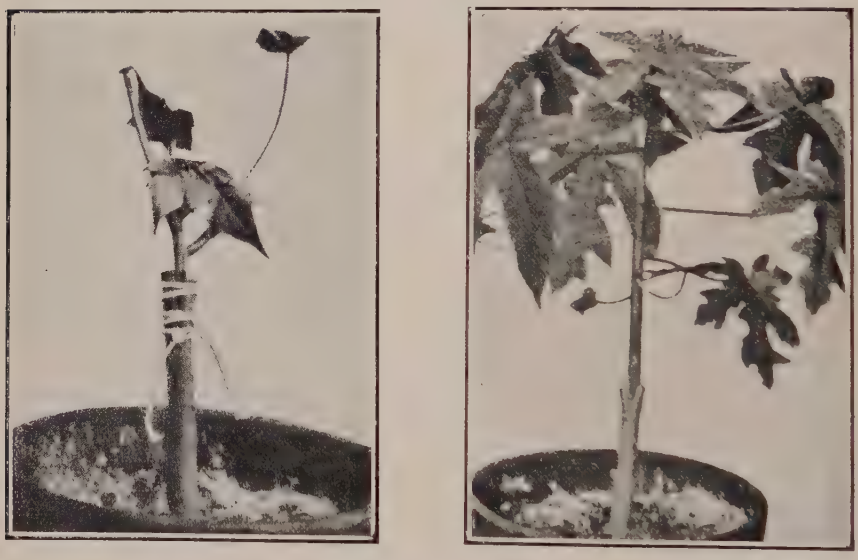


PLATE 20.—PAPAW BUDDING.

evidently lay in the fact that a bearing papaya tree under ordinary circumstances has no bud wood for grafting purposes. After a seedling begins to fruit, it does not normally produce side shoots which can be used for grafting. It has been observed for some time, however, that if the top of a bearing tree is cut or broken off accidentally, a large number of shoots begin to form, one from the upper part of each leaf scar; that is, the axil of the leaf. This takes place three or four weeks after the tree is decapitated. It is these small shoots, of which as many as fifty or more may be produced by a single tree, that are used in grafting the papaya. One of these shoots is taken when a few inches long and about

the diameter of a lead pencil, is sharpened to a wedge point, the leaf surface reduced, and inserted in a cleft in a young seedling papaya plant which has been decapitated when 6 to 10 inches high, and split with an unusually sharp, thin grafting knife. (See illustration.) At this age the trunk of the young seedling has not yet formed the hollow space in the centre. It is not necessary for the stock and the scion to be of equal size; the scion should not, however, be larger than the stock. After inserting the scion, the stock is tied firmly, but not tightly, with a short piece of soft twine. The grafted plant should be shaded for a few days after the grafting has been done, and the twine should be removed on the sixth or seventh day. The best success has been secured in these experiments by grafting potted seedlings in the greenhouse or under the shade of a lath house, presumably because the stock can be kept in good growing condition under these circumstances. Under these conditions fully 75 per cent. of successes can be expected. In the field, also, this method has been successfully followed.

A number of grafted papayas are now being prepared for a somewhat extensive experiment at Miami during the coming season, and as large a stock as possible of several selected seedlings will be provided for experimental planting in May, but the writers wish to point out particularly that as this was the first season it is possible that there may be drawbacks to the development of the papaya plantations of grafted plants, notwithstanding the fact that all the indications point towards the method of grafting as the logical one upon which to place this remarkable tropical fruit plant.

[Our illustration is also reproduced from the "Queensland Sugar Journal," and is a fac-simile of the tree we grafted some weeks ago. - Ed. "Q.A.J."]

QUEENSLAND DATES.

We should be glad to receive any information concerning date trees which have been planted by any of our readers or others. Such information, we would suggest, should state the variety planted, whether raised from seed or off-shoots (if the latter, whence obtained), and approximate weight of each when planted; date when planted; date of first fruiting; how pollinated, whether naturally or artificially; distances apart; whether irrigated artificially or not; whether cultivated or left to Nature; nature of soil and subsoil; number of bunches per tree; whether the fruits on a bunch all ripen at once or at different times; if marketed, how prepared, and selling price.

Tropical Industries.

THE LUCE CANE HARVESTER.

It would appear that the invention of a perfect cane harvester, one which will not only cut and strip the cane, but, what is most important, one which will top the cane at the proper point, no matter what the length of the cane, has been achieved by Mr. George D. Luce, who has (says the "Louisiana Planter" of 6th December) given an exhibition of his cane harvester at Audubon Park. That journal says:—The apparatus itself and the work it has been doing have been examined by many interested persons, and some of them very competent judges. The concensus of opinion among these is that Mr. Luce has developed a sugar-cane harvester that will go into practically any field of thin cane or heavy cane, where the canes are planted in rows.

The machine is driven by gasoline engines of competent power, and does each one of the three elements of cane cutting—the cutting at the bottom, the cutting at the top, and the stripping of the cane—with an equal degree of accuracy. Working as we saw it on 3rd December at the Sugar Experiment Station in Audubon Park, in a field of sugar-cane estimated by Mr. Taggart, the assistant director there, to give a yield of 30 tons per acre, we were simply astonished and gratified to see the excellence with which the work was done, foreshadowing, as it seems to do, the complete success of Mr. Luce along the lines that he has developed.

We are naturally led to compare Mr. Luce's machine with the Cockrell machine that was exhibited at Reserve last year. At Reserve there was some trouble with the traction engine, it not seeming competent to do the work then needed. We stood by Mr. Luce's machine on Wednesday, after having stepped off the distance at the end of one of the cane rows, a distance of 42 feet, and the machine was started by its engineer and travelled the 42 feet in this 30 ton cane per acre without any hesitation and without any stopping. We presume that this has been the first time that any sugar-cane harvester has accomplished that distance in heavy cane without a single stop.

Mr. Luce's machine weighs about 3^1_4 short tons. He believes that by gradual improvements this can be reduced to 1^3_4 short tons; but with the weight of his present machine it made a surprising progress through the cane row.

Mr. Luce has geared his cutting discs so that their movement makes sliding cuts on the cane, and not a direct, forcible cut, as is done with other disc machines. This may be one of the reasons of its successful traction in heavy cane.

The cane where cut by the knives at the bottom is controlled by link belt chain guides that pick the cane up from close to the ground, as well as those that are standing vertically, and bring all of these canes in

a vertical line to a point at which these guiding chains completely grasp the cane, holding it firmly in position. The stream of sugar-cane thus entering the machine enters at an angle established for the purpose, which, with some 5 or 6 feet of travel, carries the cane forward and upward until it strikes the top of the chute, when the firm grasp of the guide and feeding chains so hold the canes that the soft tops bend over, sometimes breaking off, and at that point disc cutters are arranged so that all of the canes are cut at the desired point thus attained. It struck us that in this point Mr. Luce has made a wonderful display of inventive ingenuity, and it seems to be the solution of that most vexed problem of all, the cutting of the canes properly at the top. When we recognise the fact that our sugar-canes vary in length of ripe cane from 5 to 10 feet, more generally, say, from 5 to 8 feet, after the top is off, we can appreciate Mr. Luce's achievement. These canes thus topped have in the meantime been stripped by the spring whips that move in reverse direction from the movement of the cane.

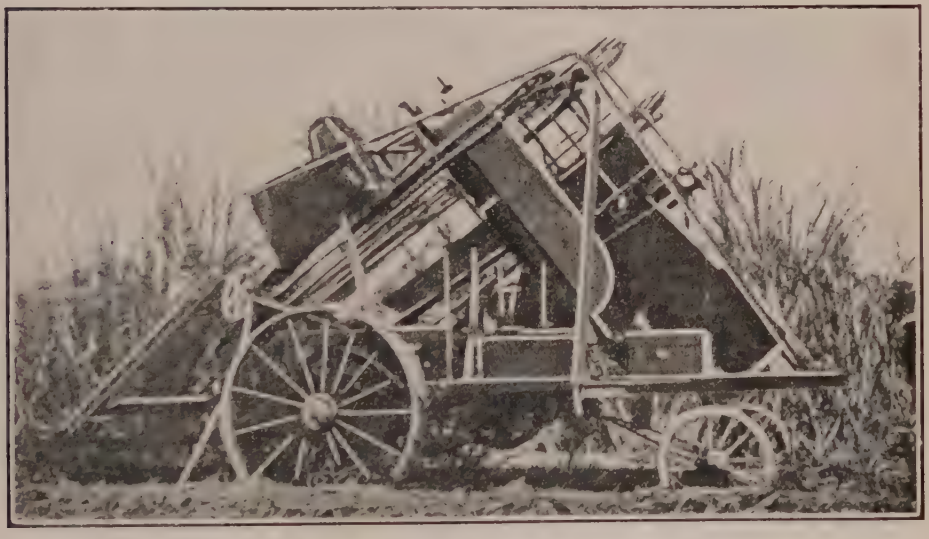


PLATE 21.—THE LUCE CANE HARVESTER.

The final delivery of the canes is down an open chute, forming a continuous windrow.

We especially inquired as to any control of the cutting apparatus as to height. Ordinarily plant canes or highly fertilised canes might give canes varying from 6 to 10 feet in length, while stubble canes and canes less well fertilised might run from 5 to 7 feet in length. We noted at once that there was an arrangement to shift from one length to another, just as readily as an automobile may have its speed changed. This, however, still leaves the Luce machine cutting the cane at the last ripe joint, whether the canes be long or short, as the bending of the top of the cane becomes a gauge point to determine their approach to the cutting discs of the topping part of the machine. It is stated that Mr. Luce has expended 160,000 dollars (£20,000) in developing his machine up to its present

condition. He thinks that there are still some improvements that might be made, although even now the machine is a working apparatus. He believes that its weight can be materially reduced by a careful study of the strength of the materials, and the diminution down to the limit of safety.

Mr. Luce intends to try the machine now in regular plantation work. A few hours' work would cut down all the cane at Audubon Park, which, of course, the management could not permit, as the Audubon Sugar School is now giving its practical lessons to a class of students in the station's sugar-house and in the station's canefield. It has pleased Professor Dodson, the director, and his various assistant directors to afford inventors every possible opportunity to perfect their apparatus, and we owe much to them for their hearty co-operation along these lines. Mr. Luce, we believe, contemplates going over on Bayou Lafourche with his machine to give it a complete canefield trial over there, and we wish him the success that he deserves, and the success that his machine indicates as already secured at Audubon Park.

The photograph appeared in the "Louisiana Planter."

NOTES ON DATE-GROWING.

(CONTINUED FROM FEBRUARY ISSUE.)

THE ADVANTAGES AND DISADVANTAGES OF PROPAGATING DATE PLANTS FROM SEEDS, AS COMPARED WITH PROPAGATING THEM FROM SUCKERS (OFF-SHOOTS).—TIME OF YEAR TO SELECT SUCKERS AND METHODS OF DETACHING THEM FROM PARENT TREES.

Propagation by Seeds.—If 100 seeds are sown, about 50 of the seedling plants will probably be male trees, and will, of course, bear no fruits. Of the 50 female, perhaps 10 trees or fewer will yield passable fruits; 5 or 6 of these will probably yield fruits of a quality equal to that of the mother tree, and one, or not even one, may yield fruits superior to hers. The characters of the male and female palms used to produce the seeds will, of course, materially affect the number of useful seedlings got.

Age at which the Sex of Seedlings can be Known.—The sexes cannot be known with certainty till the tree bears flowers; and as this will occur five to ten years after the seeds are sown, land, labour, and water will have to be provided for 100 trees for from five to ten years before the 90 more or less useless trees can be weeded out, and the ten, or fewer, passable ones can be selected.

Bearing of Date Seedlings.—The seed-bed should be prepared in March or April* as for any ordinary farm crop. The seeds should be planted in it to a depth of from 1 to 2 inches in rows, 3 to 4 feet between the rows, and then irrigated. The bed should be watered once a week till the seedlings show above ground, and should then be watered as frequently

* About September or October in Queensland.

as will keep the ground moist enough to grow any ordinary farm crop. The seedlings are extremely hardy. If they are well treated they will grow faster and come into flower sooner. They repay good treatment well, as only when they come into flower and fruit can the fruitless males and worthless females be weeded out. When three to four years of age, every alternate plant may be taken out of the nursery and planted elsewhere. The remainder may be left until flowers and fruits are shown, and the worthless varieties can be thrown out. If they can be left in the seed-bed without choking each other up, they may all be left there until they show flowers or fruits. Transplanting may be done as in the case of off-shoots (as will be described later). The rearing of date trees from seeds is not advisable for ordinary date cultivators when good off-shoots can be obtained.

The Fruit Formed as an immediate result of Pollination not affected by Characters of the Male.—The reason that so few good female trees are got from ordinary seeds is, that the female trees are generally pollinated by male trees of inferior quality, and they, of course, influence the offspring. As the female trees are almost always propagated by off-shoots in date-growing countries, and the fruit formed as the immediate result of pollination is not affected by the character of the male used, ordinary dategrowers have no incentive to breed good male trees.

Advantages of Planting by Off-shoots.—In ordinary date cultivation, propagation should be done by off-shoots. No useless trees have to be cultivated if this method is adopted, as all off-shoots from female trees will become female trees, and will yield fruits of the same quality as the mother trees. By planting off-shoots, therefore, it is possible to obtain a plantation of trees all yielding fruits of exactly the same quality. Where the date trees are reared from seeds, no individual tree bears fruits exactly like those borne by any other, and therefore the cultivator cannot supply a large quantity of fruits of exactly the same quality. This is a very important disadvantage for trading purposes.

Time of Year to Select Off-shoots.—Off-shoots should be selected when the fruits are ripe and hanging on the mother trees, as at that time there can be no doubt about the quality of the fruits that the off-shoots will bear. The trees from which off-shoots are required should then be marked with paint or in any other convenient way, and their positions recorded in a note-book, a rough plan of the positions being made if necessary.

Detaching Suckers from Female Trees.—The off-shoots are severed from the parent tree by means of an ordinary axe, the cutting being done in a plane parallel to the stem of the latter. The cut should be made as near to the tree as possible without unduly harming it. The axe should be sharp and the blows light. Every care should be taken not to shatter the off-shoot in removing it from the mother. The wound on the mother should be earthed up at once, and it is well to first coat the wound with coal tar or other material generally used to cover plant wounds.

Size of Suckers to be Transplanted.—Off-sets to be transplanted should have all the adult leaves cut back as in photo. No. 1. Practically nothing but the tender young leaves in the central bud and the bare stalks of the old leaves should be left on the plant. The object in doing this is to reduce the amount of water transpired from the transplanted off-shoots through the medium of the leaves owing to being severed from

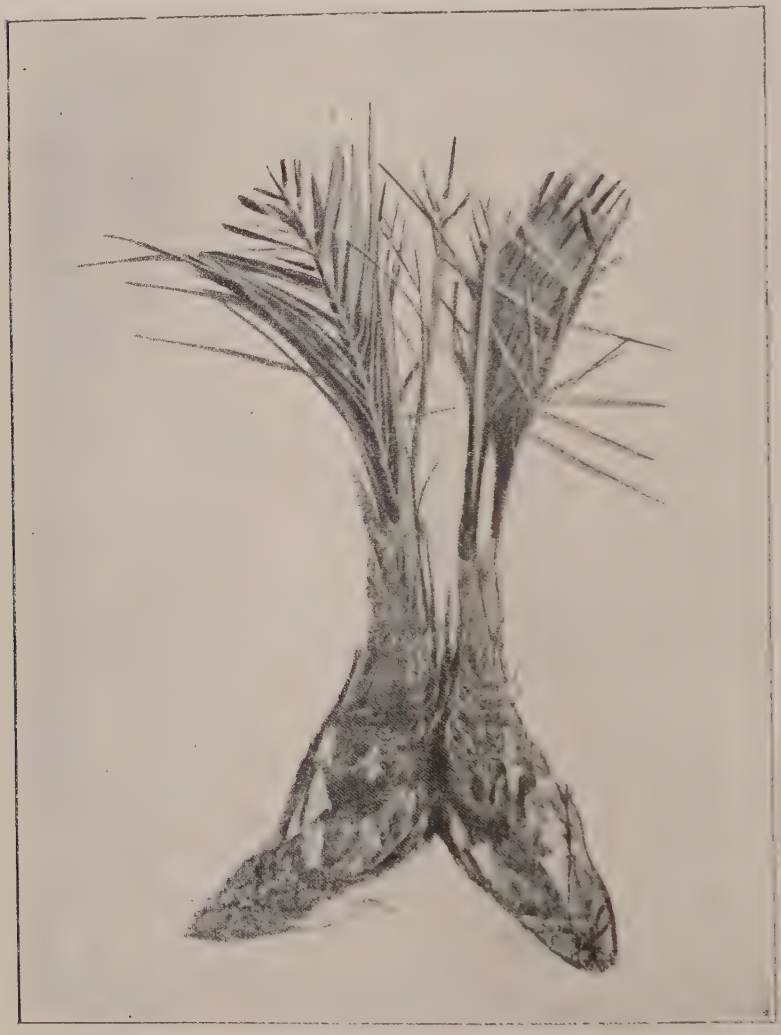


PLATE 22.—SHOWING TWO SUCKERS WITH LEAVES TRIMMED BACK AND READY FOR PLANTING.

its parent. If the amount of water given off by the leaves is greater than that taken up from the soil the plant must dry up, and will die. After the adult leaves have been trimmed back, the off-shoots should not weigh less than 6 lb. Off-shoots less than this usually die when transplanted, as, if by any chance the amount of moisture in the soil around the off-shoots becomes less than what is required, the plant has not sufficient strength

in it to replace those rootlets that may have been dried up. From the weighment of a large number of plants, I find that the average weight of an off-shoot when trimmed and ready for planting is 12 to 15 lb. Off-shoots are usually fit for transplanting when they are three to four years old, but the larger the off-shoot is the better, as there will be less danger in shattering it when removing it from the parent tree, and more chance of its doing well when transplanted.

To Induce Off-shoots to Form Roots.—Six months to a year before the off-shoots are removed earth is sometimes piled up round the bases of the mother trees and kept moist. This induces the off-shoots to send out rootlets, and increases their chances of taking root when planted out.

Care of Off-shoots after removal from the Parent Tree until Planted.—When suckers are transported long distances, and a considerable time elapses before they can be planted, it is advisable to coat their bases with mud, and cover them with palm fibre, grass, or straw and matting, leaving the crown of the off-shoot exposed. The palm fibre is kept damp by occasional sprinkling with water. The water must be applied lightly, otherwise the mud tends to be washed off the palms. The mud used should have rather more sand than clay in it, and should be about as thick as cream. Dipping is done in a box or in a hole in the ground which should be at least 6 in. wider than the diameter of the largest sucker, and 6 in. deeper than the largest base to be coated. The box or hole is filled with mud, and a sucker is placed in it and withdrawn. It is then immediately bound in wet fibre, &c. If many trees are to be treated, a larger hole is better, as it has to be refilled with mud less frequently. Care is taken not to admit the mud into the crown of the plant. . . . Suckers have been known to keep healthy for about three months when treated in this manner (Gaskin). The bases of the off-shoots may be simply bound up with a covering of palm fibre to protect them during transport to where they are to be transplanted. More frequently, no packing of any sort is done. They should, however, have their bases placed in water on the same day as they are removed from the parent tree. If this is done, and the off-shoots are strong, probably little harm will happen to them if they are not planted for a month. It is well to plant them as soon as possible, however.

Cost of Off-shoots in Arabia.—In Basia, in 1910, the cost of 100 date-suckers fit for transplanting ranged from 50 to 75 rupees (£3 6s. 8d. to £4 3s. 4d.).

PLANTING DATE TREES AND CARE OF YOUNG PLANTATIONS.

The Advantages and Disadvantages of having Dates in Plantations as Compared with having the Trees round the Borders of Fields.—If date trees are grown on the edges of watercourses or fields, a large number of palms may be grown without diminishing the area of land under other crops. Once established, they can also be grown with little or no additional water supply, as the water supplied to the field crops is

usually sufficient for the palms. When palm trees are grown in a plantation, a large number of plants can be more easily watered and attended to when young than if scattered around the edges of fields, and when the trees are bearing fruits the latter can be more easily guarded from birds and other enemies. The death-rate among young date-suckers in the first two years after being planted out is so alarming when water has not been regularly given in suitable quantities, and where the trees have not been properly attended to, that, in cases where these attentions cannot be ensured, it would probably be better to plant the trees in a nursery and grow them there till they have developed a good root system, and then

PLATE 23.—ARABIAN DATE PLANTATION AT CENTRAL JAIL, MULTAN, PLANTED IN 1910. PHOTOGRAPHED ABOUT TWO YEARS LATER. ONIONS GROWING BETWEEN THE LINES.

transplant them into permanent places with a ball of the nursery earth undetached from their bases. A year's growth or more will be lost by planting the trees a second time, and they will have to be well attended to till they establish themselves in their new positions, but the death-rate among the plants will be very much decreased. Much less water will be required for a number of trees in a nursery than if they are widely scattered over a large enclosure. Even when old trees have to be replaced in a date plantation, it may be advisable to grow the suckers in a nursery for a time before planting them in their permanent positions, as these

young plants require much more water and attention than the older trees, and they are very apt to be neglected if scattered about in odd places. In suitable localities, dates are probably a more paying crop than any other; and, if vegetables, lucerne, and other crops are grown between the trees, a piece of land laid out in a first-class quality of date trees ought to be a very paying investment. When the difficulty of the enemies can be got over easily, however, I think it would be well to have a considerable number of trees planted round the edges of the fields and along water-channels. As the many factors involved differ not only in different districts, but with each individual cultivator, each intending date-grower will have to decide what is best to be done in his own case.

(TO BE CONTINUED.)

HOW COCOANUT BUTTER IS MADE.

According to the United States consul at Carlsbad (Austria), most of the cocoanut butter manufactured in Bohemia is made of Cochin-China or Indian copra, which is received in large wooden tuns. The dried copra is sliced, and the fat is extracted by oil presses—quite a simple process. This raw oil contains soap fats and does not have a pleasant odour. It is placed in large tanks, and the first step in the refining process is the addition of powdered chalk, which absorbs the soap fats and settles to the bottom of the tank. The oil on the surface is pumped into another tank, passing through four or five filters as the second step in the refining process. It is then forced into a tank heated by steam pipes to about 270 to 518 degrees F. This process continues until the oil is as clear as crystal and begins to bubble. It is then pumped into an automatic weighing apparatus and run into the moulds, where it is allowed to cool. The tablets or cubes are removed to the packing table. Part of the oil is run into various-sized tubes and is also placed on the market in this form. The soap fats, combined with the chalk, are treated with sulphuric acid, which dissolves the chalk, leaving the fats floating on the suface of the solution. These are drawn off into tubes and are sold to manufacturers of soap. The trimmings of the copra slices are made into a powder, which commands a good price as fodder for cattle and pigs. The cocoanut fat is white, but when manufactured into butter is coloured to resemble oleomargarine. Sesame oil is added to make the product more pliant. Cocoanut butter keeps well either raw or refined, and does not spoil for months, even in warm weather. It is claimed that the ordinary consumer cannot detect the difference between this butter and oleomargarine. Six or seven years ago the output of cocoanut butter in Austria was about 40 tons a day. It is now approximately 300 tons. The price has increased from 18.25 dollars (£3 15s.) to 26 dollars (£5 8s. 6d.) for 200 lb. The factories claim that they cannot keep up with the demand. The market is controlled practically by two firms—one in Vienna, the other in Aussig.

Entomology.

SHEEP-MAGGOT FLY PEST.

[CONTINUED.]

REPORT OF THE ASSISTANT GOVERNMENT ENTOMOLOGIST.

I have the honour to report that on the 2nd October I visited the Central-Western District in company with Mr. A. H. Cory, Chief Government Veterinary Surgeon, for the purpose of obtaining specimens of sheep-maggot flies and identifying our injurious species.

At Longreach we were met by Mr. Telford (the local representative of the Queensland Pastoralists' Association), and, during the following week, drove to various large sheep stations and made the acquaintance of some of the leading pastoralists. Proceeding later to Emerald, we studied conditions obtaining in the Springsure District, and obtained additional samples of maggots from several localities.

It is not my intention to deal comprehensively with this subject, but to avoid as far as possible needless repetition of facts already widely known, and, by recording original observations, to add a little information to that already published on the question.

A FEW MISCELLANEOUS NOTES.

The disastrous drought of 1902 is supposed to have favoured the rapid multiplication of this pest in New South Wales and led to its acquiring the fatal habit of blowing live wool, but I am disposed to think that in parts of Queensland, at any rate, drought conditions may operate differently, and tend to check rather than promote the breeding of flies.

Intense dry heat, coupled with a minimum amount of shade and dew and prolonged abnormally, soon extracts all moisture from a dead animal, and myriads of maggots, unable to develop properly under such conditions, are compelled to pupate before being fully grown. Many of these pupæ become too dry and so perish, and the remainder, as a result of such premature transformation, produce undersized flies which are mostly of the male sex.

FIRST APPEARANCE OF THE PEST.

Blown sheep are said to have been first noticed in Queensland in 1883, but the trouble did not assume a serious aspect until many years afterwards. The fly was in evidence in Barcaldine in 1903, although no alarm was occasioned until six years later. At Gindie and Longreach, however, it failed to appear until 1910, and in parts of the Springsure district has not become a pest until quite recently.

LOSSES.

Many stations experienced heavy losses last season, the fly being unusually aggressive, attacking lambs and wethers alike, and blowing ewes a month off shears. At Capella 600 wethers, with two months' wool, were continually getting blown, and one station had about 50 per cent. of ewes "struck."

On a selection at Longreach 40,000 out of 100,000 ewes were "blown," and it is stated on good authority that a couple of men made £400 in two months out of wool collected from dead carcasses of fly-blown sheep on one station only.

FRESH DEVELOPMENTS IN BLOWING.

A breeder at Emerald had about 4 per cent. of three months' old lambs blown around the base of the horns. This occurred in March, while they were feeding in long grass kept fairly moist by heavy dews. Mr. J. S. Rowan, of Talleyrand, has noticed a number of instances of sheep being blown in the eyes during hot weather.

One of the most pathetic sights witnessed, however, was a mob of eight-months-old weaners, 10 per cent. of which were badly blown under the tail.

SHEEP-MAGGOT FLIES.

I was rather surprised at not seeing a single specimen of the yellow-bodied blow fly *Calliphora villosa*, which occurs commonly in Brisbane, and, according to Froggatt, blows sheep in New South Wales.

This species is said to come into houses at Longreach during the winter, and Mr. W. G. Brown, State Sheep and Wool Expert, has noticed it at Alpha in July in considerable numbers. The closely-related maggot fly *Calliphora oceania* was not seen at Longreach, but I saw a couple of specimens at Emerald.

Apparently the dry heat of our Western climate is uncongenial to both these flies, which seem to prefer a more humid atmosphere and are most abundant near the coast. They have never been observed on living sheep either at Longreach or on Peak Downs, and their occurrence during the cooler seasons need occasion no alarm.

Unfortunately they are well represented in Queensland by two equally obnoxious sheep maggot flies, which are responsible for the present critical state of affairs and are widely distributed throughout an area embracing about 50,000 square miles. In the absence of necessary technical literature on the Muscidæ, I have provisionally identified one of these species as *Calliphora rufifacies*;* the other fly is evidently the so-called European "green bottle fly," a slightly smaller insect of somewhat similar colouration to the above, but more slender in shape.

Both of these flies congregate plentifully on garbage in back yards, and have an objectionable habit of entering homesteads, and, in the

* The correctness of this identification has since been confirmed by the Department of Agriculture, New South Wales.

absence of fly-proof doors, swarming over food at meal times like ordinary house flies. They are especially fond of cake and jam tarts, &c., a liking that is not without economic interest as showing the readiness with which they should be induced to take sweetened poisoned baits.

I have bred both species from maggots taken from live wool procured at Crossmore, Talleyrand, Strathdarr, Emerald, Springsure, and Gordon Downs in the Longreach and Peak Downs District.

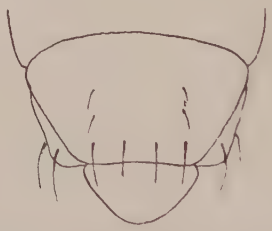
It may interest pastoralists to know that the little clusters of white substance observable on blown wool are eggs of maggot flies, and that sometimes this stage is dispensed with, and the female deposits living larvæ among the wool. These, when fully grown, drop from the animal and, entering the soil, change into pupæ, somewhat resembling those of ants (mis-called "ants' eggs"), but firmer and generally much darker.

Lucilea sericata has previously been recorded as a sheep-maggot fly by Mr. Tryon, and was bred by me from maggots taken from live wool forwarded to this office by Veterinary Inspector H. O'Boyle from the Western-Central District in 1910.

Calliphora rufifacies, however, has not hitherto been known to blow sheep in Queensland, and in view of its specific identity being of general interest, I have thought it advisable to give a short description of the living fly so that it may be easily recognised

DESCRIPTION OF *CALLIPHORA RUFIFACIES*.

General colour golden green, with irridescent coppery tints. Prothorax with three longitudinal pinkish dorsal streaks, more or less distinct, the middle one being faintest. Metathorax with sub-dorsal coppery streaks, a transverse row of four black spines close to posterior edge, and other spines arranged as shown in the accompanying sketch.



Under portion of thorax and head clothed with short white hairs, particularly in the male.

First abdominal segment and hind edges of second and third segments dark blue, anal segment light metallic gold, tinged with irridescent copper and bearing a few rather long black spines.

Head broader proportionately than in *Lucilia sericata*, with eyes light chocolate brown, and antennæ reddish yellow. Face blackish above, yellow beneath, and clothed with white pubescence.

Length of full-sized female 10 mm. and of male 9 mm.

NOTE.

After death the characteristic golden-green colour darkens to bluish, and occasionally living specimens are greenish blue, but this is very exceptional. When bred in confinement under an average mean temperature of 75·5 deg. F., the life-cycle of this species occupies twelve days, eggs laid at Longreach on 7th October producing maggots that pupated seven days later, from which the flies emerged on the 18th of the same month.

The larva of this species is the so-called "hairy maggot," erroneously thought by some to be an advanced stage of the smooth maggot of *Lucilia sericata*.

CONTROL SUGGESTIONS.

The following recommendations relate exclusively to the entomological side of the question, other preventive measures, including dips, sprays, and crutching, &c., being fully dealt with by my colleague—Mr. A. H. Cory, M.R.C.V.S., Government Veterinary Surgeon—in his official report.

TRAPPING FLIES.

In a recent number of the "Queensland Agricultural Journal" (August, 1913) I suggested the advisability of adopting some systematic method of trapping the adult flies, and alluded to the possibilities ahead of future experimentation in this direction.

Observations in the field have more than ever convinced me of the value of this method of control, which is not only simple and practicable, but goes to the root of the trouble, by preventing the laying of eggs and larvæ, a matter of the first importance when it is remembered that each female fly deposits about 500 eggs.

There are various ways of trapping flies, but arsenical poison baits appear to promise the best results, and have already been tried in a small way by one or two pastoralists at Emerald, who found that a dead carcass or a sheep skin wetted with Cooper's poison dip killed many of the flies attracted to it.

A few experiments with sodium arsenite have proved very satisfactory, and I find that a bait composed of ½ dwt. of this poison mixed with ¼lb. of sugar and 4¼ fluid oz. of water, is greedily eaten by blow flies, either in a liquid state or when crystallized. Our common meat flies—*Calliphora villosa* and *oceania*—were found to be quickly affected, being disinclined to fly ten minutes after sucking it, and quite dead in half an hour.

Carcasses sprayed with this bait would doubtless attract and destroy millions of blow flies, but when used for such a purpose they should always be surrounded by a suitable wire mesh to avoid the possible destruction of useful birds.

Traps of this sort are easily constructed, and should be designed with a view to preventing any maggots that might develop and drop from the carcass from reaching the soil to pupate.

The use of decaying animal matter as an attraction, however, has many drawbacks, and it may be possible before long, to employ a better kind of trap, using the same poison bait, but alluring the flies by means of some strongly smelling chemical substance.

It has occurred to me that a trap of somewhat similar design to the "Hodge fly-trap" used for controlling stable flies in America, would, if adapted to suit our requirements, be very suitable in coping with sheep-maggot flies. Its record in the States is reported to be 37½ quarts of flies in a week, and I see no reason why it should not do splendid work in Queensland.

To make the best use of this form of trap it would be advisable to take full advantage of the habit which flies have of flying to strong light, and construct a small chamber of weather-boards about 7 by 5 by 5 feet in size, in which to place the bait and fix the trap.

The initial expense in installing a number of such chambers would be trifling in comparison to the permanent benefit derived, and, once established, it would only be necessary to renew the bait at intervals and make periodical visits to remove dead flies.

Before attempting any extensive system of trapping, experiments should be conducted to determine the average range of flight of these maggot-flies, and the greatest distance at which they can perceive odour from dead animals and will travel to reach it, &c.

DESTRUCTION OF DECAYING ANIMAL MATTER.

The value of this control measure cannot be over-estimated, as it is surely the height of folly to allow so formidable a pest to breed unrestrainedly. And yet, with but few exceptions, this is just what is being permitted at the present time, and pastoralists evidently do not fully recognise the importance of checking such wholesale breeding. Shearing-sheds are admittedly centres of infection, and it is commonly believed that sheep are more liable to get "struck" whilst in such places than at any other time.

We visited several sheds and invariably noticed heaps of blown wool lying about the yards, and a dead sheep or two, or offal, &c., close to the buildings.

Upon turning over one of these carcasses, squirming masses of maggots in all stages of growth were disclosed, and further inspection revealed the presence of additional thousands inside the body. It is no exaggeration to state that every dead sheep is a possible breeding ground for many thousands of flies, for it must be remembered that the life-cycle of these insects—from egg to winged state—is completed in less than three weeks, so that a carcass would be likely to lie long enough to supply food for two or more successive broods of flies.

Is it any wonder, then, that such insanitary shearing-sheds quickly become sources of infection and are a continual menace to the entire flock?

We were pleased to meet a selector at Emerald who makes a practice of burning all such refuse as soon as discovered.

He was troubled with fly about two years ago, but is now free from attack, and attributes his good fortune entirely to the abovementioned systematic destruction of breeding matter. Such cleaning up may not always be easy, especially on open country where there is little or no wood available, but it is highly important that the present careless state of affairs should be remedied, and I would suggest that it be made compulsory to destroy all decaying animal matter lying in the vicinity of shearing-sheds.

PRESERVATION OF BIRDS.

This question is an eminently practical one, and intimately associated with the present trouble. It was observed that, as a general rule, timbered country or scrub land affording shelter for bird life was free from, or but slightly infested by, sheep-maggot flies, whilst on extensive areas devoid of trees the pest was generally at its worst.

This was particularly noticeable both at Longreach and Emerald on well-timbered stations adjoining open country, the former being usually free from fly and the latter infested.

Mr. W. G. Brown, State Sheep and Wool Expert, tells me that he has not yet heard of a single instance of blown sheep on the so-called "desert" or spinfex country.*

This class of land is not open, as the name erroneously implies, but supports a great variety of edible shrubs, and although unable to explore the district I should imagine it would be fairly rich in bird life.

On a well-timbered selection near Emerald, where I heard the notes of a number of kinds of small birds, the owner was not troubled by maggot-flies. His neighbour, however, only a mile distant, whose land was comparatively open, had 5 per cent. of his ewes "struck," and told me that from the first he had noticed the great scarcity of bird life on his selection.

The above facts are significant, and suggest the advisability of not only protecting our insectivorous birds, but of encouraging them to breed more freely by providing suitable cover, and, where needful, introducing useful indigenous species. The shade derived from such shelter would also be appreciated by stock, especially in open country, where I am told it is not unusual in hot weather to see sheep standing with their heads against fencing posts trying to find relief from the burning heat. It is surprising how birds will endeavour to make the best of surrounding conditions and continue to breed in spite of seemingly insurmountable obstacles.

Whilst at Strathdarr, I was shown two nests of the Black and White Fantail (better known as "Shepherd's Companion"), in Parkinsonia trees, the foliage of which gives very little shade and is too open to screen nests from view.

Another little bird was building close to the house in a deciduous tree about 4 feet high, and entirely leafless at the time of our visit; and swallows were nesting under the roof of a veranda.

* Since writing this report, however, he informs me that a case has occurred at Alpha.

Parkinsonia aculeata is exceedingly hardy and has thoroughly adapted itself to Western climatic conditions, but many of our native trees in the district afford denser shade and are more suitable for breeding purposes.

SOME USEFUL BIRDS NOTICED AT LONGREACH.

Crows.—These birds are commonly seen on dead carcasses, and have been observed to pull aside dried skin to get at the maggots beneath, and to pick pupæ of the fly from soil under dead sheep. In addition to eating maggots, &c., they undoubtedly help to check the breeding of flies by cleaning up decaying animal matter.

NOTE.—We cannot at this juncture afford to dispense with the services of the crow, and, although it occasionally kills sickly sheep and lambs, I would strongly advise its protection for the present.

Scavenger Kite.—This is a most useful bird and should be carefully guarded from injury; it is said to be an introduction from Java, and appears to feed exclusively on carrion.

Magpie Lark or Peewee.—Not very plentiful.

Ground Lark.—Met with constantly in the open.

Shepherd's Companion.—A notable fly catcher.

Magpie.—Common in places.

Swallows.—Very numerous; an exceedingly useful species.

Jay.—A few specimens noticed.

Bustard ("Wild Turkey").—Plentiful, a great destroyer of grasshoppers.

NATURAL ENEMIES.

At Talleyrand I was fortunate in finding unmistakable evidence of the presence of a parasite of *C. rufifacies* affecting a large percentage of the pupæ of this fly found under a dead sheep. The carcass was nearly dried up, and all insects had emerged, so I collected a few hundred living pupæ and larvæ close to Longreach in the hope that some of them would be parasitised.

On the 29th instant, scores of hymenopterous parasites, apparently belonging to the Chalcidæ, emerged from these pupæ, all being of the one species—a small shining black wasp, 2½ mm. long, with legs (except femore) and basal joint of antennæ light yellow.

Its small size and general structure indicate that it is especially fitted for crawling among wool or other substances in search of its host. No secondary parasites have appeared up to the present.

PREDACEOUS ENEMIES.

Staphylinid beetles were more or less in evidence under dead animal matter, the largest of these (*Creophilus* sp.) being fairly numerous and probably useful to some extent; this is a matter, however, that awaits further investigations.

Much benefit might result from the introduction into Queensland of other species of the same family, some of which are known to devour maggots of flies.

It is of interest to mention, for instance, that in 1904 Compere discovered a styphlinid beetle at Sao Paulo feeding upon fruit-fly maggots, and succeeded in introducing it into Western Australia to help to fight the Mediterranean fruit-fly.

ISOLATION OF BLOWN SHEEP.

The separation of blown from unblown sheep is advisable, on the grounds that the former attract maggot-flies, and, if herded by themselves, would be likely to divert attack from the unaffected portion of the flock. In addition to the above advantage, the blown animals would be under better control, and their progress towards recovery, or the reverse, more easily observed.

STOMACH WORMS A CONTRIBUTING FACTOR.

Wool soiled by diarrhœa or scouring, due to the presence of intestinal worms, is very attractive to blow flies, and illustrates the importance of avoiding the evil of over-stocking pasture, and the necessity for prompt treatment of animals affected with stomach troubles.

In conclusion, I would suggest the adoption of the following preventive measures:—

1. The wholesale destruction of adult sheep maggot flies by means of poison baits and traps placed near shearing-sheds, homesteads, and clumps of trees, &c.

2. The prompt destruction of all dead animal matter noticed around the homestead or in the paddock.

   Note.—A quarter of a pound of meat is said to furnish sufficient food to breed 250 blow flies.

3. The preservation of insectivorous and carrion-eating birds, the introduction, where advisable, of useful indigenous species, and the planting of patches of trees suitable for cover in which they may breed in security.

4. The study of the natural enemies of sheep-maggot flies, both predaceous and parasitic.

5. The isolation of blown sheep from those unaffected.

6. The destruction, as far as possible, of the stomach worm, *Strongylus contortus*.

The above recommendations call for concerted and systematic action on the part of pastoralists, who, up to the present, have done little or nothing to avert a situation which, to say the least, is alarming, and, if allowed to continue unchecked, is likely to seriously hamper the future prosperity of one of our great industries.

DESTRUCTION OF HOUSE-FLIES BY AN ANT.

Professor J. F. Illingsworth, Ph.D., Professor of Entomology, College of Hawaii, Honolulu, has been making investigations at the College as to the work of the little brown ant (*Pheidole megacephala*) in the destruction of house-flies, and his investigations indicate that this ant is the principal factor holding house-flies in check under the tropical conditions of Fiji. Writing to the "Hawaiian Forester," the Professor says:—

"It is roughly estimated that fully 75 per cent. of the flies are destroyed. I first called attention to the value of this ant as a destroyer of house-flies while carrying on investigations in the Fiji Islands during the past summer.

"The remarkable scarcity of house-flies in Fiji indicated that something was effectively destroying them. With all the open refuse-pits which prevail there, one would naturally conclude that these flies would multiply in hordes. In fact, if nothing held them in check in a country with the climatic conditions of Fiji, they would become so abundant that humans would not be able to exist. Recognising this fact, I suspected that some parasite was preying upon them, and began a series of experiments to discover it. The refuse-pits were found to be very free from maggots, much to my surprise, and later I discovered that this was due to the fact that the little brown ants got most of the eggs and larvæ of the flies almost as soon as they were produced. The eggs and newly-hatched maggots of the house-fly are very small, but by very close observation I was able to see the ants carrying them off in myriads. I also found that the ants even attack and destroy the full-grown maggots whenever they appear on the surface of the manure.

"In one experiment 200 newly emerged adult flies were entirely destroyed by the ants, which accidentally found their way into the breeding cage. The attack was only discovered after most of the flies had been dismembered. A few were still in the toils, with six or eight ants holding them by wings and legs while others proceeded to cut them to pieces. All of the fragments were finally carried away to the nests of the ants.

"While this species of ant is not so abundant here as in Fiji, it is gratifying to know that they have the same fondness for an insect diet. House-flies being one of man's worst enemies, coming from filth on to his food and spreading all sorts of contagion, people in tropical countries are particularly fortunate in having such a check upon their spread. Though the little brown ants are often a nuisance by getting into things which are unprotected, we must give them credit for the good work that they do for us.

"As is well known here, ants can easily be kept out of cupboards, &c., by surrounding the legs with tapes wet in an alcoholic solution of corrosive sublimate. This treatment remains effective for a long time unless the tapes become wet or dusted over."

Mr. E. Jarvis, Assistant Government Entomologist, says that this particular ant is widely distributed in Queensland, and that it is a

destroyer of many kinds of insects. They may be "a nuisance," as above stated, but "let them have all credit for the good work they do for us." Ed. "Q.A.J."

Our esteemed correspondent, Mr. J. A. Hamilton, of Tolga, might obtain some of these ants, which would, according to what we know about them, quickly abate the nuisance he complains of as to slaughter-house refuse.

THE ORANGE MOTH.

Little has been heard of late years of the destruction of oranges in Queensland orange groves, caused by the Orange-piercing Moths (Fam. Ophiderimæ).

In 1898, and also in previous years, these moths were very much in evidence in the months of March, April, and May, when the oranges, although full-grown, were still green. As early as 1869, a French botanist, Mr. A. Thozet, who had a fine orange grove at Rockhampton, discovered one of these moths, *Ophideris fullonica*; and, having scientifically dissected the moth, he made the discovery that it possessed a remarkable proboscis which enabled it to bore holes through the skin of the fruit, and then feed on the juice. This discovery he recorded in the Rockhampton "Bulletin" of that year. In 1871, Mr. Thozet further made this known to Mons. J. Künckel d'Hereulais, assistant naturalist at the Paris Museum of Natural History, accompanying his statement with illustrative examples* of the insect concerned.

Again in May, 1875, the destructive rôle enacted by these insects was enlarged upon by Mons. Thozet in a communication over the signature "Pomona," appearing in the Rockhampton "Bulletin" of ——— May and the "Capricornian" of 8th May.

The late well-known Queensland lepidopterist, Mr. W. H. Miskin, disputed the finding in a letter on "Insect Enemies of the Orange," printed in the "Queenslander" of 22nd May, 1875. To this "Pomona" furnished an able reply, dated 10th June, 1875, which appeared in the Rockhampton "Bulletin" of that month. This controversy between Messrs. Thozet and Miskin, having been in due course brought under the notice of d'Hereulais, he was induced to again consider Mr. Thozet's allegations, and, as part of his inquiry, to examine the proboscis or sucking organ of the moth to which it referred. This renewed investigation on his part then brought to light the marvellous and exceptional structure that it exhibited, and that seemed to answer so well to the function of piercing comparatively hard substances that had been attributed to it by Thozet. This he made known in a special memoir entitled "Les Lepidoptères, à Trompe Perforante, Destructeurs des Oranges,"† that was communicated by Emile Blanchard to the French Academy of Science on 3rd August, 1875, and printed in the annals of that society.

* These examples were shown to us when on a visit to Mons. Thozet in 1874. [Ed. "Q.A.J."]

† The Lepidoptera, with perforating proboscis, destroyers of oranges.

F. Darwin also described this strongly fashioned piercing organ of *Ophideres,* and wrote to Mr. Thozet, "congratulating him on his discoveries," remarking that they supported his own observations on the habits of *Phalenes* that perforated the nectaries of certain flowers.

We need not repeat all the arguments of the most noted entomologists of the day, who were all agreed that Mr. Thozet was absolutely correct in his description of the proboscis of this moth, and that Mr. Miskin's impugnment of Mr. Thozet's observations was inadmissible.

In Vol. II., Part 4 of the "Queensland Agricultural Journal" for 1898, will be found an exhaustive paper on "The Orange-piercing Moths," by H. Tyron, Government Entomologist, which we hope to reprint shortly in pamphlet form. Meanwhile, the accompanying photograph will give a plain illustration of the moth (of which there are numerous varieties), the caterpillar, the chrysalis, and the remarkable proboscis which enables the insect to inflict so much damage on an orange grove. The moth has lately been much in evidence in some parts of the State, and not only has it confined its attention to oranges, but also to mangoes and, it is said, to bananas. Even grapes have been the subject of its visitation, and Mr. Tryon noted that grapes, especially the Black Hamburg, shed their fruit in a way which might "very possibly be ascribed to the fact that Orange Moths had visited the bunches."

REMEDIES.

1. By means of the cane or scrub knife cut off at the roots all plants which it may be concluded, by direct observation, support the caterpillars, or moths in their immature state, or that may be identified with food plants from the descriptions previously given (pp. 310 and 311), and growing in scrubs or on rock banks in the vicinity of orange orchards, and destroy at the same time whatever caterpillars or chrysalises may be thus encountered.

2. Where it is practicable, and economically justifiable, destroy the entire woody vegetation where such food plants may be expected to exist.

3. Remove all brushwood from the vicinity of orange orchards, that the moths may have little or no harbouring places in the intervals between their nocturnal visitations.

4. Afford, if practicable, a counter-attraction; and capture or net the moths thus diverted from pursuing their destructive work. They are especially partial to highly-flavoured bananas of the Cavendish type. Thus, suffer to remain on one or two of the latter plants, if growing conveniently, as many bunches; till the over-ripe fruit drops to the ground. Or, preferably, hang in places that can be conveniently visited, wrapped in calico, small bundles containing similarly conditioned fruit of this description—five or six bananas in each. These to be nightly visited with lantern and net in hand, when the not readily disturbed Orange Moths amongst others may be captured.

Plate 24.—Mænas-Salaminia, *Fabr.* Argadesa Materna, *Linn.*
(Male and Female.)

5. Poison the moths by impregnating the bananas with a syrup containing a small proportion of arsenite of potash made by boiling equal weights of white arsenic (arsenious acid) and bicarbonate of potash in

PLATE 25.—OTHREIS FULLONICA, *Linn.*
(Male and Female.)

water. Sixty-four grains of each of the chemicals named to 4 oz. of water form convenient proportions for the manufacture of the poison.

It must, however, be borne in mind that the best results may be obtained by beginning operations long before the season for oranges commences. From what has been already stated (*vid.* p. 311) the early broods of the insect—viz., those that occur before the end of December—

Plate 26.—Othreis Fullonica, *Linn.*

are comparatively small, but from them arise, by accessions with the birth of each successive brood, the very large numbers that visit orangeries notorious for injury to their fruit of the nature described.

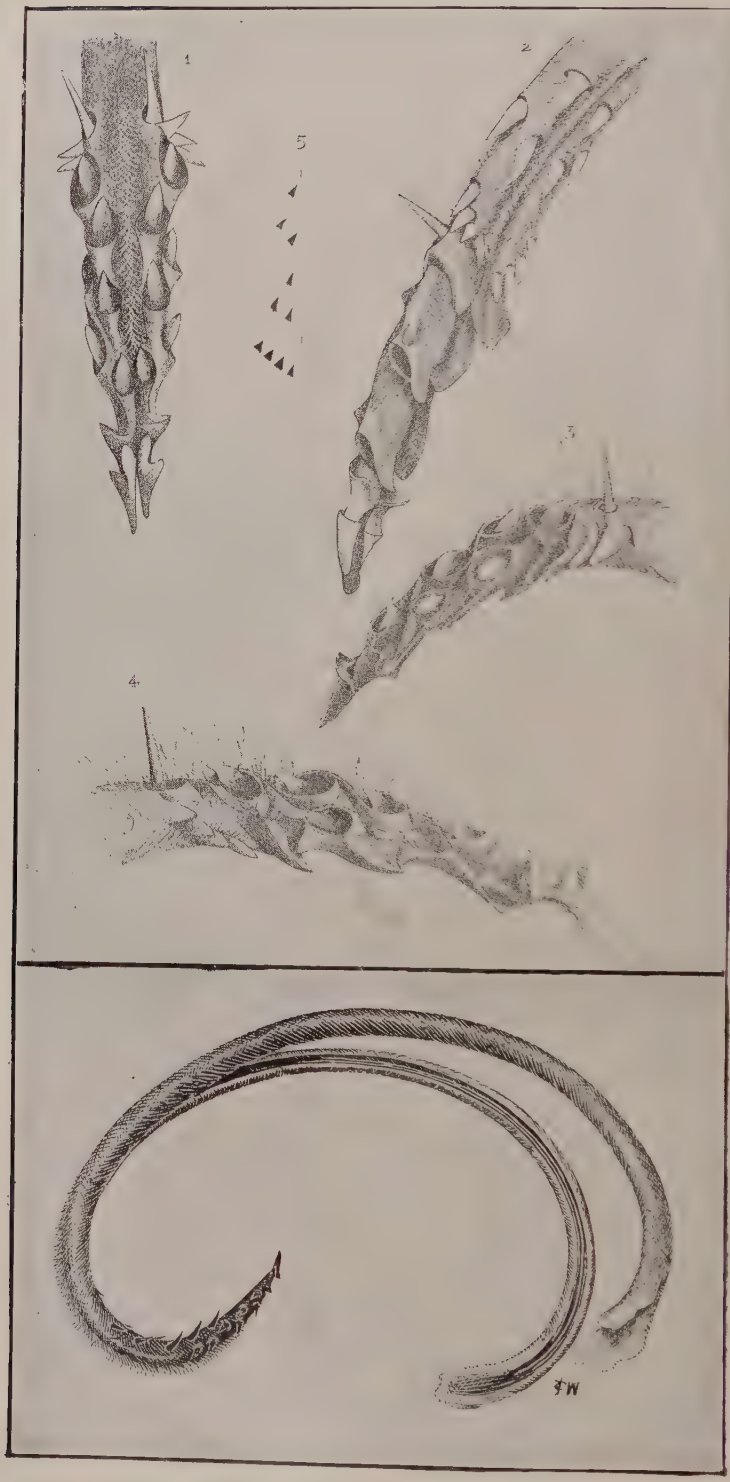


PLATE 27.—PROBOSCIS OF ORANGE-PIERCING MOTHS.

Plate 28.—Othreis Fullonica, *Linn.*
(Chrysalis in Leaf and Isolated.)

UP-TO-DATE MACHINERY.

A Victorian farmer, now of the Downs, writes:—"In Brisbane, the other day, I dropped into the machinery depôt of W. A. Preston and Co., where I was introduced to old and valued friends of my native State; Victorians are no strangers to 'Robinson's' disc ploughs. These ploughs suited soils in Victoria similar to what we have here, so that I expect to see them largely in use in the immediate future. The smooth, silent running of an oil engine so fascinated me that I closely investigated. Well-known people gave it such a character for power, utility, and economy that a 3½ B.H.P. 'New Way' oil engine became mine on the spot. I can recommend this depôt to those in search of up-to-date machinery—farming and dairying in particular. The manager is exceptionally clear and explicit to questioners."

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

BY F. MANSON BAILEY, C.M.G., F.L.S., Colonial Botanist.

Order ASCLEPIADEÆ.

HOYA, R.Br.

H. Macgillivrayi, *Bail.* sp. nov. (Plate 29). A strong glabrous climber. Leaves subcoriaceous, about 4 in. long, 2 in. broad across the blunt cordate base, from which it tapers to an acuminate apex: margins recurved; nervation seen under a lens quite dense, the nerves alone prominent and only a few of these conspicuous. Petioles under 1 in. long, minutely glandular at its junction with the lamina. Peduncles and pedicels slender for the size of the flowers—the former 2 in., the latter 3 in. long. Flowers about six (6) in an umbel. Calyx segments broadly ovate, 2 lines long. Corolla phialaform (saucer-shaped), $2\frac{1}{2}$ in. diam., segments broad, pale lavender, the tips and edges darker. Corona purple, $\frac{3}{4}$ in. diam., segments linear, obtuse.

Hab.: Claudie River, Lloyd Bay, *Dr. W. Macgillivray.*

The plant under notice approaches in its leaves those of *Hoya coriacea*, Blume, while the inflorescence approaches that of *Hoya imperialis*, Lindley.

HOW TO PRODUCE LARGE CARROTS.

On the subject of how to obtain monstrous carrots, such as seen on the exhibition table, a successful grower writes:—The ground should be deeply trenched, working in plenty of soot as the work proceeds. When ready to sow, rake the surface down level. Afterwards stretch lines across the ground 18 in. apart, then, with a crowbar against the line, holes should be made 12 in. apart and 2 ft. deep and 4 in. across at the top. These must be filled up with a mixture of three parts sifted loam, two parts leaf soil, and half part of wood ashes and dry powdered fowl manure. Make the soil moderately firm, and sow a few seeds on the top of each, to be ultimately thinned out to one. Keep them well watered during dry weather, and fine soil should be placed around the collar of each as the season advances to prevent the crown from becoming green. They will, when pulled, be found to be splendid shape, of good colour, and free from side growth and stringy roots.

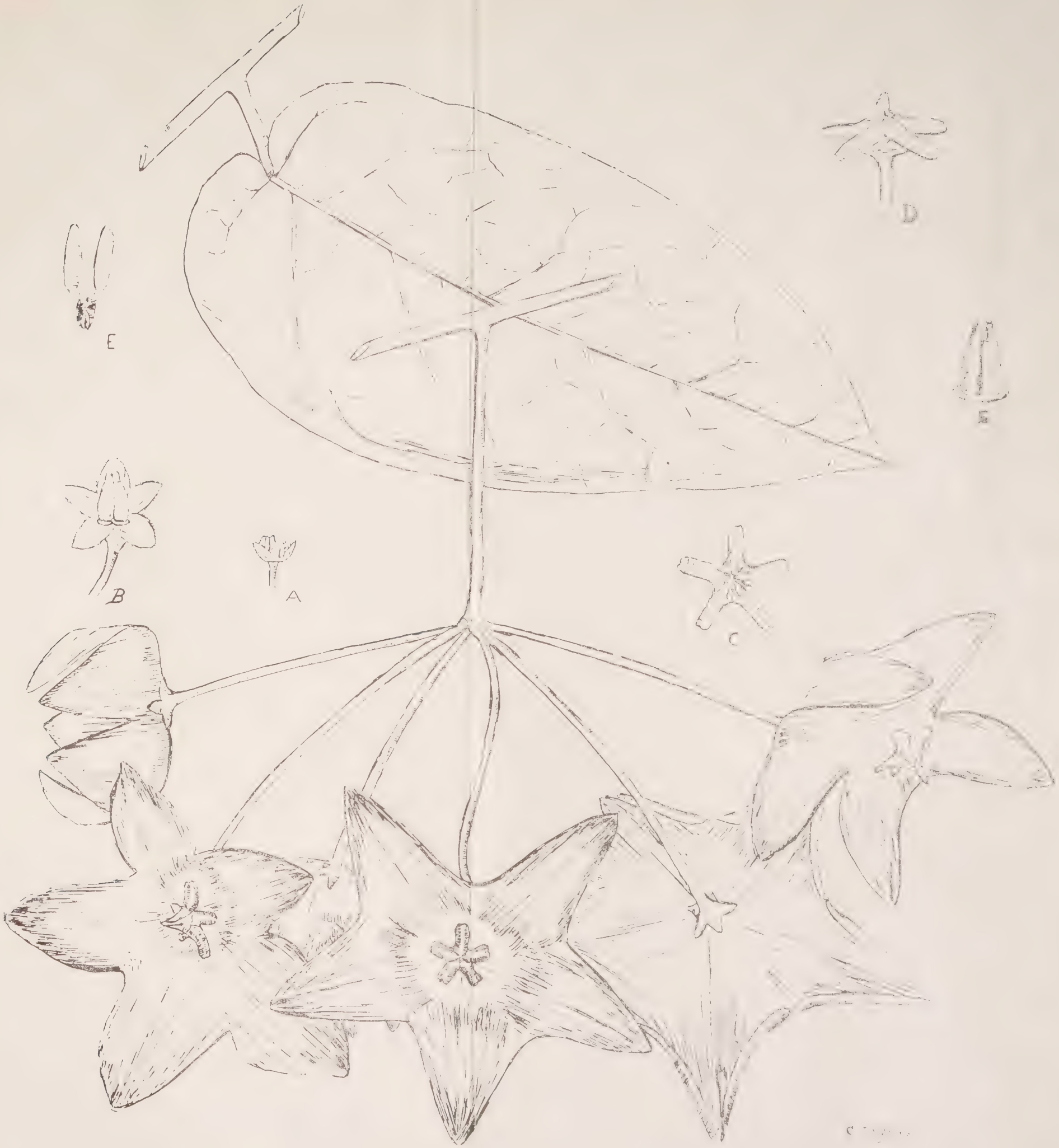


Plate 29.—Hoya Macgillivrayi, *Bail., sp. nov.*

A—Calyx and pistil (nat. size). B—Calyx and pistil (enl.). C—Corona, viewed from above. D—Corona, side-view (nat. size).
E—Gland, with pollen-masses (enl.). F—Ovaries (enl.).

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JANUARY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING JANUARY, 1913 AND 1914, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Jan.	No. of Years' Records.	Jan., 1914.	Jan., 1913.		Jan.	No. of Years' Records.	Jan., 1914.	Jan., 1913.
North Coast.	In.		In.	In.	*South Coast*—continued:	In.		In.	In.
Atherton	13·49	11	7·23	37·99	Nanango	4·84	25	3·25	5·31
Cairns	18·87	25	21·69	32·03	Rockhampton ...	9·54	25	0·74	16·56
Cardwell	17·69	25	21·68	27·90	Woodford	7·43	25	4·06	9·79
Charters Towers ...	6·97	25	6·12	2·95	Yandina	10·15	19	6·95	20·63
Cooktown	15·10	25	33·93	26·43					
Herberton	10·06	25	6·41	26·43					
Ingham	17·14	20	17·36	29·28					
Innisfail	25·50	25	15·52	53·61	*Darling Downs.*				
Mossman	22·71	5	32·80	22·75					
Townsville	15·02	23	14·90	11·69	Dalby	4·17	22	3·28	2·95
					Emu Vale	3·32	17	1·95	2·74
					Jimbour	4·13	24	2·27	2·30
Central Coast.					Miles	4·29	25	2·60	2·63
					Stanthorpe ...	4·05	22	2·06	3·44
Ayr	12·67	25	10·11	8·80	Toowoomba ...	5·87	22	3·73	7·45
Bowen	11·59	25	6·83	6·99	Warwick	3·87	22	1·52	2·50
Mackay	15·83	25	22·52	26·17					
Proserpine	18·30	10	11·19	17·54					
St. Lawrence ...	11·04	25	7·97	13·75	*Maranoa.*				
					Roma	3·98	21	1·13	3·43
South Coast.									
Crohamhurst ...	13·37	20	6·71	17·41	*State Farms, &c.*				
Biggenden	5·18	14	1·33	3·84					
Bundaberg	9·48	25	1·39	45·48	Gatton College ...	4·48	14	5·40	4·71
Brisbane	6·59	63	3·90	4·94	Gindie	3·82	13	2·66	3·18
Childers	8·06	17	2·20	28·78	Kamerunga Nurs'y	17·98	23	28·97	...
Esk	5·94	25	2·58	3·96	Kairi	...	..	..	11·05
Gayndah	5·65	25	4·13	12·20	Sugar Experiment Station, Mackay	14·70	16	24·88	...
Glasshouse M'tains	...	...	6·27	17·82					
Gympie	7·31	25	5·05	18·17	Bungeworgorai ...	...	...	0·92	3·51
Kilkivan	5·67	25	1·52	8·88	Warren	...	...	0·75	12·98
Maryborough ...	7·95	25	2·07	23·57	Hermitage ...	2·71	7	1·41	...

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for January this year and for the same period of 1913, having been compiled from telegraphic reports, are subject to revision.

General Notes.

EXPERIMENTAL FEEDING WITH SOME ALLEGED POISON PLANTS OF NEW SOUTH WALES.

(FROM THE AGRICULTURAL GAZETTE OF NEW SOUTH WALES.)

(BY J. BURTON CLELAND, M.D., Ch.M. (Syd.), Principal Microbiologist, Microbiological Laboratory, Department of Public Health, Sydney).

From time to time various reports have appeared dealing with plants deleterious to, or supposed to be deleterious to, stock of various kinds. The most notable contributions have been from Mr. J. H. Maiden, the Government Botanist of New South Wales, and from Mr. F. M. Bailey, C.M.G., Colonial Botanist, and Mr. Gordon, of Queensland. These authorities have collected together numerous references to the reputed poison plants of Australia, systematically arranged according to their natural orders.

In using the list of plants collected by the abovementioned authors, which have been considerably added to by other contributors, it is found that in a number of instances it is more a matter of suspicion as regards the plant incriminated rather than any actual proof that it is responsible for the harm resulting. Since it is hard often, when insufficient information is available, to differentiate illness or death resulting in some way from the ingestion of poison plants from illness or death due to the action of micro-organisms, it is probable that it has frequently happened that deaths really due to the one cause have been attributed to the other, and *vice versâ*. Animals, for instance, suddenly dying from anthrax, may be suspected to have fed upon an intensely poisonous weed, and, similarly, two or three sudden deaths from a poison plant may be attributed to anthrax. Unfortunately, very few of the alleged poisonous plants of Australia have been systematically experimented with; the result is that much material has to be dealt with in a microbiological laboratory which is probably not associated in any way directly with micro-organisms. Were our poison plants and their attributes better known in many cases, then perhaps these obscure illnesses and deaths could be sheeted home to their actual cause. This would tend to lessen considerably the routine labour of laboratory work. With this object in view, and in the hope that any work undertaken in regard to poison plants might eventually lessen the labours the Microbiological Laboratory is called upon to undertake in investigating these obscure diseases, the opportunity was taken to carry out certain experiments at Milson Island, with such plants as were available in the district and were on the black list as having been suspected of being poisonous.

The accompanying paper is a short summary of the results of those experiments, which appear to have been the means of eliminating from

the black list a few plants on which suspicion had formerly rested. A note of warning must, however, here be given, namely, that though the plants did not prove poisonous under the conditions of the experiment and in the amounts given, it does not necessarily follow that under other circumstances they might not be deleterious.

ORDER DILLENIACEÆ.

Hibbertia diffusa.

It was noticed on Milson Island that a small Hibbertia with rather large spathulate leaves and large yellow flowers was left quite untouched in the rabbit paddock in which all other plants were eaten off. This suggested that possibly the plant might contain some poisonous constituent. In consequence, the following experiments were conducted:—

Sheep.—A sheep was fed from 11th March to 14th June, almost daily, the amount eaten varying from about 2 oz. to, later, 6 oz. No ill effects were noticed.

Rabbits.—Four rabbits were also fed upon the plant. The first died suddenly after fifteen days' feeding. The second seemed to be paralysed after eleven days' feeding, and shortly afterwards died. The third was fed from 15th April to 27th April, and again on 30th April, 1st May, and 3rd to 9th May, on which latter date it died; the control rabbit also died on this date. The rabbit experimented on seemed paralytic in its hind legs for two days before it died. A fourth rabbit was fed almost daily from 5th July to 14th July, 1912, and on 15th July it died.

Comment.—These experiments suggest that though this plant eaten in small quantities is not poisonous to sheep, it is injurious to rabbits.

ORDER EUPHORBIACEÆ.

Omalanthus populifolius.—Native Poplar.

Maiden ("Agricultural Gazette" of New South Wales, Vol. 8, Part I., January, 1987, p. 18) quotes Baron von Mueller as stating in the "Australasian Chemist and Druggist," September, 1883, that cattle succumb to the effects of this plant, the final cause of death being haematuria. In the "Garden and Field" for 1894, p. 243, Mr. Maurice Holtze considers that this plant causes redwater in the Northern Territory; but he has evidently confused redwater due to tick fever with the South Coast redwater of this State.

Experiment at Milson Island.—A calf was fed from the 10th June, 1912, almost daily, till 18th October, 1912, with the leaves of this plant gathered fresh on the Hawkesbury River. The amount given varied from 12 to 24 oz. daily. The plant was cut up and given with other food. No ill effects at all were detected.

Comment.—The amount given daily to this calf is probably more than would be eaten by any animal under natural conditions. It seems certain that this plant does not cause redwater in cattle, and it is, therefore, unnecessary to continue further experiments.

ORDER LEGUMINOSÆ.

Indigofera australis—Native Indigo.

This plant has been suspected also as being the cause of South Coast redwater in cattle.

Experiment at Milson Island.—From 10th June, 1912, till 21st November a calf was fed almost daily with the leaves of this plant. The amount eaten daily varied from about 6 oz. to 30 oz., the usual amount eaten being about 12 to 16 oz. No ill effects at all were noticed.

Comment.—The amount of this plant eaten daily is probably more than would be taken by an animal under ordinary circumstances. It would seem certain that this plant does not cause redwater in cattle. Under the conditions of the experiment, also, it may be noted that fresh material was obtained almost daily in the Hawkesbury River district. The plant does not seem in any way injurious to stock. It may, of course, happen that the plant may contain hydrocyanic acid, or, when specially luxuriant, may give rise to a tendency to hoven; but it seems certain that it does not contain, in any amount sufficient to cause symptoms, any other definite poisonous body.

ORDER SANTALACEÆ.

Exocarpus cupressiformis, R.Br.—Native Cherry.

Maiden ("Agricultural Gazette" of New South Wales, Vol. 8, Part I., January, 1897, p. 20) quotes Woolls as saying that branches of this plant produce cerebral disease in horses on the Castlereagh.

Experiment at Milson Island.—A sheep was fed almost daily from 11th March, 1912, till 6th June, other food being given in addition to the branches of this plant. On 6th June the sheep was butted by a cow, and died the next day, death being entirely attributable to this accident. No ill effects were noticed from the feeding.

Comment.—It would seem from this experiment that this plant is not poisonous in any way to sheep, or probably to other animals as well. The evidence on which it has been incriminated seems hardly sufficient to require a repetition of this experiment.

ORDER CUCURBITACEÆ.

Cucumis myriocarpus—Small Wild Melon.

From time to time considerable suspicion has been attached to this plant. Unquestionably the stringy nature of its stems may tend to produce impaction. Apart from this, however, it has been suggested that some poisonous principle exists, especially in the fruit, and also that this poison may be responsible for the peculiar attacks of blindness in horses in the extreme western parts of New South Wales.

Experiment at Milson Island.—A bull calf was fed with twenty-five of the fruit cut up, and given as a drench, on 4th April; on 5th April he was drenched with fifty-five melons, on 6th April with 100 melons,

on 30th April with 100 melons, on 1st May with 100 melons, and on 2nd May with 100 melons. No ill effects were noticed.

Comment.—It seems certain that, even in as large a dose as 100 melons, sufficient poison is not present to injure a calf.

ORDER LOBELIACEÆ.

Lobelia purpurascens.

This little Lobelia is common in places, and, though not being large in size, has a succulent leaf. As it belongs to a Natural Order containing amongst its members poisonous plants, it was subjected to investigation.

Experiment at Milson Island.—Three rabbits were fed daily with a small quantity of this plant. One died in thirteen days, but another experimental rabbit also died on the same day, and death was probably not due to the plant eaten. Another rabbit died on the sixth day after feeding started. The third rabbit was fed from 15th April till 28th June almost daily, the amount taken being on an average from 2 to 3 oz. It remained perfectly well.

Comment.—Though two of these rabbits died, the deaths cannot be certainly attributed to the Lobelia. The fact of the third rabbit eating the plant for a considerable period without showing ill effects seems to exclude this plant as being a definitely poisonous one.

ORDER CYCADEÆ.

Macrozamia spiralis.

Numerous references occur to a disease popularly called "rickets," attributable to feeding on the leaves of a species of Macrozamia, both in New South Wales and Western Australia. Professor Stewart, then an officer of the Veterinary Department of this State, was able some years ago to produce the disease on the twenty-third day by feeding cattle on an average of about 2 lb. a day.

Experiment at Milson Island.—A cow was fed with Macrozamia leaflets which were cut up into small pieces by means of scissors and mixed with chaff, from 13th June, almost daily to 4th December. The amount eaten was usually about 1 lb., varying occasionally up to 30 oz. During this period no ill effects at all were noticed. The animal was well fed after it had eaten the Macrozamia leaflets.

Comment.—It would seem from this experiment that an animal eating daily about 1 lb. of Macrozamia leaflets, supplemented by other nourishing food, does not develop "rickets." The amount given was less than the experimental amount of 2 lb. a day given by Professor Stewart. If, however, the Zamia contained any active poisonous constituent, one would think that a pound eaten daily for a period of five months would manifest some signs of its action. This, however, was not the case. It is probable that cattle in very poor country, being half-starved, will eat the plant, and I am inclined to think that manifestations of the disease are not so much due to any definite poisonous body in the plant as to the fact that the mixed food taken by these animals on such

poor country, though sufficient to prevent them from dying, is lacking in some constituent necessary for the proper nourishment of the nervous system. My experiments seem to suggest that, as in scurvy and beri-beri in man these conditions are due to the absence of some body—vitamin—in small amount, so perhaps in these half-starved animals the absence of a similar constituent is the cause of the trouble. If such be the case, one would naturally not expect to produce the disease in animals receiving other abundant nourishing food.

This experiment might perhaps be repeated with advantage.

ORDER LILIACEÆ.

Xanthorrhœa sp.—Grass-tree.

"Cattle at Karuah said to become crampy. The cattle swell in the legs, fall off in condition, and continue unthrifty, even some of them dying. If removed to good, sound country, they do well."—"Agricultural Gazette," New South Wales, 1899, p. 859. In reference to this statement, Mr. Pottie, then Lecturer in Veterinary Science at the Hawkesbury Agricultural College, is reported as saying that conditions identical with those described are produced in cattle which eat the young shoots of the grass-tree after rain. He says that the shoots contain a resin, and the effects upon the animal's system are loss of appetite, condition, energy, and vitality, followed by weakening of the hindquarters, which eventually become paralysed, the animal dying of exhaustion and exposure.

Maiden ("Agricultural Gazette," New South Wales, Vol. 8, Part I., January, 1897, p. 22) quotes J. S. Allan as saying that the settlers in the vicinity of Jervis Bay had informed him that the shoots of the grass-tree, when in blossom and eaten by cattle, give them a complaint called "cripples." It appears to affect their joints, and doubles them up.

Experiment at Milson Island.—A calf was fed from 5th November, 1912, till 2nd May, 1913. It was given from 1 lb. up to 32 oz. almost daily for this period. During part of the time, at the beginning of the experiment, the young shoots were taken from flowering plants, and portion of the flowering stem was also used. Later, when the flowering was over, just the young leaves were cut up and given. The animal was also given lucerne hay in the morning, the grass-tree being cut up and mixed with chaff in the evening. The animal ate the grass-tree well. No ill effects were noticed at any time.

Comment.—This experiment does not support the view that the condition referred to was due to the eating of grass-tree leaves. It does not quite exclude the possibility under the special circumstances mentioned by the recorders, namely, young shoots in plants which are flowering, and young shoots after rain. It seems, however, hardly worth while to repeat experiments of this nature. It is probable that cattle only eat the leaves when there is a scarcity of other more natural fodder, and the symptoms are perhaps explainable on the fact that all necessary sustenance is not contained in the food they have access to under these circumstances.

BANANA JUICE AS A CURE FOR SNAKE-BITE.

The articles we lately published on this subject have attracted considerable attention in some tropical countries, especially in India, and we are much indebted to the courtesy of Mr. G. H. Krumbiegel, F.R.H.S., Economic Botanist of the Government Botanic Gardens, Lal-bagh, Bangalore, India, who has kindly forwarded us the following extracts from the "Madras Mail," one of the leading Indian dailies, on the subject of the banana-juice cure for snake-bite, in the hope that it will prove of some practical value to our readers:—

[Extract from the "Madras Mail," dated 11th October, 1913.]

BANANA JUICE AS A CURE FOR SNAKE-BITE.

"One of my tapping boys was bitten on the foot by a Russell's viper (*Bungarus Indica*) whilst collecting latex. After killing the snake the boy was made to bite the snake and to swallow a certain portion of its blood, a very prevalent custom amongst the Malayalees of this part of the world when bitten by a poisonous snake, the idea being that the poison goes back again into the snake, thus saving the patient's life. According to the Malayalee idea, I have seen this done several times out in the villages far away from medical aid, but in no case has the remedy been efficacious, as in all the instances that I know of where this custom has been practised the patient has succumbed. However, the boy and the snake were brought down to my factory, where he was treated by the 'Lauder Brunton' treatment by my conductor, who has been trained by me to use the lancet according to the directions given by Lauder Brunton and sent out with the lancet. From the time that the boy was bitten to the time that the treatment could be put into force some ten minutes had elapsed. A ligature was tied some few inches above the wound, and the wound well scarified by the lancet, after which a few grains of the crystals of permanganate of potash were well rubbed in, making the wound bleed a little. The patient was then placed on a stool, with the foot immersed in a pail containing a strong solution of the above potash. And as I had a day or two ago read in the 'Tropical Agriculturist,' September number, of the wonderful properties of banana juice as a remedy for snake-bite, I caused a plantain tree (banana) to be cut down and the juice from the excised trunk collected in a vessel, and the patient was given doses of the juice to drink at intervals of every ten minutes. The treatment was kept up for about two hours, the ligature removed, and the patient walked away as if nothing had happened to him. After the boy had been cured a Numbudri snake doctor arrived, and expressed his surprise at the cure effected. He examined the snake, and said that it was easier to cure a cobra bite than the bite of a Russell's viper. The juice of plantain trunk was known to him as being efficacious in cobra bite and the bites and stings of venomous reptiles which abound in these parts. In cases of Russell's viper's bites, he says that the juice of *Calotropis gigantea* is used by them with good results. This shrub is found all over India. The leaves are taken, bruised, and boiled in water; the solution from the same is

given to patients bitten by Russell's viper, which, he says, has the effect of liquifying the blood, which in a patient bitten by a Russell's viper congeals, and is brought back into circulation by the decoction of the abovenamed shrub. However, I am pleased to be able to record that the remedies we applied were successful, as recorded above."

[Extract from the "Madras Mail," dated 17th October, 1913.]

BANANA JUICE AS A CURE FOR SNAKE-BITE.

"I have read with great interest the successful cure for 'snake-bite,' as practised by Mr. R. D. Roos Norman, of Trichur, on his tapping boy, in your issue of the 11th instant. I and probably many others would be very thankful if he would kindly inform us as to the quantity of banana juice to be administered in a dose at an interval of every ten minutes for a period of two hours, which is taken neat, I presume, and whether the solution of permanganate of potash, in which the bitten part is immersed, is of a very dark colour, and the duration of immersion."

[Extract from the "Madras Mail," dated 25th October, 1913.]

BANANA JUICE FOR SNAKE-BITE.

"In reply to 'F. D.,' in your impression dated the 17th instant, I have the pleasure to inform him that the banana juice should be administered neat in quantities of half a wine-glass full at an interval of every ten minutes, for a period of about two hours. The solution of permanganate of potash should be of a very dark colour, and the duration of immersion about one hour."

Dr. J. S. K. Elkington, Chief Quarantine Officer-General, Queensland, who has had large experience in India in connection with the collection of snake venom, confirms the statement of the deadly nature of the Russell's viper. He says that this snake, unlike all others, has a hollow tube through the venom fang, other venomous snakes having an external groove, from which the venom may be wiped off by the fang passing even through a silk stocking. This snake has also the terrible power of squirting its venom to some distance, and the snake men in India are very careful to turn the reptile's head away from them when extracting the venom.

HOME-CURED BACON.

Some time ago we referred to a bacon-curing demonstration, held at Bathurst, under the auspices of the local Agricultural, Horticultural, and Pastoral Association, the demonstrator being Mr. D. Hogarth, of that city. The process adopted is one that has been in vogue among certain families in the North of England for centuries, and may be considered one of those old family secrets, known only to a limited number, and highly profitable to the owners.

At the demonstration, eleven pigs of varying weight, breed, and feeding were treated. Some of them weighed under 200 lb., while a couple turned the scale at 340 lb. and 350 lb. respectively. All of the bacon has since been cut into, and in every case great satisfaction has been expressed as to the quality of the product. One of the owners has sold all that he could spare of the bacon at 1s. per lb., and would make a great favour of selling the hams at 1s. 6d. per lb. The other owners have so far refused to sell at any price.

Since the article appeared, Mr. Hogarth has been the recipient of numerous inquiries, by letter and otherwise, by persons struck with the manifest novelty of the process, and we are, therefore, encouraged to publish a brief recapitulation of the method adopted, for the benefit of such of our readers as may be interested in the matter, and with confidence that those who chose to try Mr. Hogarth's methods will be well satisfied.

For every 100 lb. of flesh the following ingredients are necessary:—8 lb. dry Black Horse Liverpool salt, 3 oz. saltpetre, 1 lb. good brown ration sugar, and $1\frac{1}{4}$ oz. allspice. For heavy pigs, especially when there is thick skin, as in the case of old, fat sows, a large quantity of salt is advisable. The process is one of dry-salting throughout, no brine-soaking being permissible. That part of the process which is most novel is the most necessary part—the cleaning of the flesh. After the carcass has been cut up it is allowed to cool for twenty-four hours, and the meat is then placed on a sloping surface, a portion of the salt being rubbed into the skin side with the aid of a stone until every inch of the skin is softened and presents a white, pasty appearance. Then the flesh side is salted by hand, the salt being thoroughly well rubbed in. The salted pork is then piled up and left to drain for forty-eight hours, the liquid drained from it being thrown away. The theory is that this liquid contains all the impurities voided from the flesh, and the result of the demonstration goes to prove that it is this cleaning process which is the most important, and the thorough observance of which ensures the keeping qualities of the finished article.

In forty-eight hours the cleaning should be complete, but if the flesh is still discharging it must not be treated for the next process until it has thoroughly given up all the deleterious matter, after which half of the salt remaining is mixed with half the saltpetre, and vigorously rubbed in, exactly as in the cleaning process. The balance of the salt and saltpetre is then mixed with the sugar and allspice, and applied with less vigour, but not less thoroughly. The liquid resulting at this stage must be as carefully collected and preserved as that from the cleaning is rejected. This second liquid is liberally poured over the rapidly curing flesh every day or two, care being taken that each piece gets its full quota. The liquid bathing is continued for nearly three weeks, when the bacon is hung up to dry, after which it is smoked, excepting in cases where owners prefer unsmoked bacon. In smoking, nothing but good hardwood sawdust should be used, ironbark or box dust being preferable. Corn cobs are considered useless, being deficient in creosote. The smoking is continued for

seven days, and the bacon will then commence to ripen, and will keep for an indefinite time, though it should not be stored in a hot or variable temperature, and should always be kept hanging. It will be better in flavour if not cut into too soon.

CURING HAMS AND BACON.

Amongst the farm products of the old country on which the farmer and his wife pride themselves are the grand flitches of bacon and the well-cured hams which grace the beams of the kitchen or store-room. What bacon, what ham, was ever so good and tasty as that cured properly on the farm? We are now close upon the time when the cold weather will enable the farmer to renew his year's supply of these delicacies. There is little need to instruct well-informed farmers of old standing how to produce a really good article, but every day new men appear on the land —not only farmers' sons, but city men—who have very little knowledge of farming or pig-raising or dairying, but who are intelligent and willing to carry out any useful suggestions which may, by their adoption, add to their comfort or to their bank account. To these we offer the following remarks on bacon-curing:—

Do not attempt to make bacon or cure hams at any time between between September and May. They may say the factories do it successfully. So they do; but the farmer has not all the expensive appliances of the factory. All his appliances consist of a salting table and a couple of curing tubs, and these, although all-sufficient for the winter months, are of little value in the summer. Now, the first thing to bear in mind is, that the farm pig must be killed at the proper season of the year. On the cool Downs, that season may begin in May and end in September. On the coast, June will be the safest month to work in, and August the latest. Farther north the season is shorter still. In any case, the coldest months must be availed of. Especially does this advice relate to the curing of hams. If these are not thoroughly cooled they will not take the salt properly. Hams are worth 1s. per lb., so it will evidently pay to exercise great care in properly curing them. When the pig has got quite cool is the time to cut it up. The meat then should be hung up and left to cool further during the night, or even longer. We have given many recipes for the curing of bacon and hams, and now we give one which is the outcome of long experience of a South Australian farmer. This is his method, which he has found very successful:—

The first factor to success in this work is to kill the pigs at the proper season of the year. This must be in the cold season, as the hams must be thoroughly cooled, or they will not take the salt properly. His practice was to hang the meat out for one night, and if not sufficiently cold in the morning he put it out the second night. The hams should always be cut to nice shape. No rough edges, rags, or pieces only partly cut off should be left. For pickling he had two cases of solid wood made to hold the brine. One to hold the meat from one pig was 2 feet 4 inches by 1 foot 3 inches by 15 inches, and the other 4 feet 3 inches by 2 feet 3 inches by

18 inches; this latter is sufficient for two pigs. The case should be made watertight by soaking it thoroughly. He then mixed sufficient salt with about one-twentieth of its weight of saltpetre. A thin layer was sprinkled on the bottom of the case, the hams first rubbed well with the mixture, and then packed with flesh side upwards. Plenty of the mixture was packed on top, especially about the exposed bones. The sides and flitches are similarly treated, and packed in layers with flesh side upwards, except that the top layer is reversed. The sides and corners of the case are packed with pieces of pork, and then brine is added. He made the brine thick enough to float an egg; then, when it was quite cool, it was poured over the pork until it was just covered. The contents of the case should be turned over about once a week. The flitches of bacon should be left in pickle for two weeks, then taken out and immersed in fresh water for twelve hours, after which they should be hung up in the smoke-house. The hams should remain in pickle up to six weeks, and afterwards soaked in water for twenty-four hours. When taken out of the water the sides and hams should be laid on a table and the skin side rubbed with the hand to secure a soft surface free from wrinkles. They should then be hung in the smoke-house. If the smoke is regulated properly, two or three days will suffice. Each must judge for himself when the meat is smoked sufficiently. He preferred to have it a brownish-yellow tint. For smoking he used only moist chips from the woodheap, but care must be exercised that the chips only smoulder and do not burn brightly. He had followed this system of curing hams and bacon for many years, and the product always met with favour. He saw no necessity for the use of anything but salt and saltpetre for the pickle.

COMBATING FLIES AND MOSQUITOES.

The Under Secretary for Agriculture and Stock lately received from Mr. A. Hern, Noumea, a report of a discovery made by the Government Veterinary Surgeon, Mr. M. Lang, Noumea, of a remedy for the "Flat-fly" and mosquitoes. Mr. Lang's report states:—

"We all know with what persistency the well-known flat-fly, which has caused prohibitive measures to be taken by the Commonwealth of Australia to prevent its introduction into the States, return to the attack on stock, when attempts are made to drive them away. We also know that if one succeeds in catching them by hand, how difficult it is to kill them, owing to the elasticity of their teguments, and to the flattened shape of their body; which enable them to resist a certain degree of pressure. The only and the best method we have of disposing of them is to tear off their heads, since no known substance will effect their destruction. Cocoanut oil, or oil of juniper, or petrol will drive them away temporarily, but without producing any toxic effect.

"It therefore appeared to me that it would be interesting to publish the results of a series of experiments, which I have made on this subject, and which give promise of doing good service under certain conditions. I refer to cod liver oil, which has a specific toxic effect on all flies,

mosquitoes, and ticks. If those parts of a horse most subject to the attacks of the fly are lubricated with this oil, the effect is to instantaneously kill even those flies which have only been lightly touched by it. It is possible to relieve a horse in a few minutes of all the flies with the hand, smeared with this oil, and there is no danger of any subsequent caustic action on the skin.

"The same toxic action takes place in the case of house-flies and mosquitoes, and even ticks, which are so hard to extract from the skin of a dog." [This presumably applies to our scrub ticks.—Ed.] "This is not the sole effect produced. It acts prophylactorily in driving the flies from all places treated with the oil, although the effect lasts only from thirty to forty-eight hours.

"Its action manifests itself, furthermore, very usefully in cases of sores, on which sun baths alone would act, were it not that the flies, always most numerous in the vicinity of sores, did not nullify this sun treatment. Smeared with cod liver oil and without any other treatment, such sores are rapidly healed. This result may, therefore, prove valuable in the case of contagious sores, since it suffices to paint them with cod liver oil, to remove all danger of possible transmission through the agency of flies and mosquitoes.

"Its one drawback as regards its use in houses is its strong odour. I may further state that, spread on the surface of water, it kills the larvæ of mosquitoes more quickly than petrol or kerosene, and that, in consequence of its slower evaporation, it keeps off the adult insects for a longer period. Vessels full of water receiving a very slight film of this oil *never contain any larvæ*. It would therefore appear that here we have a prophylactory superior to kerosene. In conclusion, I may state that cod liver oil alone possesses this property, other fish oils with which I am experimenting having a caustic effect on the skin.

PUBLICATION RECEIVED.

THE BANANA.

ITS CULTIVATION, DISTRIBUTION, AND COMMERCIAL USES.

We have received from Messrs. Duckworth and Co., publishers, London, a copy of a very interesting book on the above subject by W. Fawcett, B.Sc., F.L.S., late Director of Public Gardens and Plantations, Jamaica, in which the author has brought together a fund of information relating to bananas, which cannot but prove of great assistance to banana-growers in Queensland. The book, in addition to its value as a text-book on the subject, is well illustrated, and amongst the illustrations are some quaint drawings of the banana plant, reproduced from old engravings dating as far back as 1721 and 1750 A.D. The medicinal properties of the fruit and plant are described in a separate chapter, as well as the commercial products which can be obtained from small unsaleable bananas, in the shape of wine, whisky, and alcohol from the fruits, and fibre from the stems. The magnitude of the loss which would accrue to Jamaica alone from bananas which cannot be profitably

exported is shown by the fact that over three million bunches come annually under that category, and in all exporting countries put together as many as eight millions of bunches annually fail to come up to the high standard insisted upon by the shippers. The value of these eight million bunches, reckoned at 6d. each, is a matter of £200,000 per annum, and this in Jamaica alone represents £80,000 a year.

The author devotes a chapter to banana cultivation in Queensland, quoting from the pamphlet on the subject issued by the Department of Agriculture and Stock, and refers to the considerable stimulus the important and profitable industry in our State has received by the importation of the Gros Michel variety from Jamaica. He also describes the methods of packing and shipping bananas from Innisfail and Cairns to the Southern States.

The book is the most complete work we have yet seen on the subject of banana-growing, and it should be in the hands of all engaged in the industry in this State. The London publishers are Messrs. Duckworth and Co., Henrietta street, Covent Garden, W.C.

CLOSE SEASON FOR OPOSSUMS AND BEARS.

A proclamation appeared in the "Government Gazette" of the 10th January extending the close season for opossums and native bears from the 1st May, 1914, to the 31st October, 1914. The effect of this proclamation, with the period specified in the Acts, is to totally protect opossums and bears to the 30th April, 1915.

EXPLOSIVES IN AGRICULTURE.

At a demonstration recently given at Pinnacle, near Mackay, of the use of explosives in agriculture, a farmer present stated that on his farm he had some stumps that he could not get men to grub at 10s. each, yet he was splintering those stumps to such an extent with a couple of pounds of dynamite that they were easily burned out of the ground, roots and all, at a cost of a little over 2s.

SUSCEPTIBILITY OF PLANTS TO DISEASE.

The "Journal of the Board of Agriculture" of British Guiana (October, 1913) takes the following interesting note on the above subject from the "Journal of Agricultural Science":

Susceptibility to mildew and yellow rust in wheat, and to mildew in barley, is increased by providing the plants with large amounts of available nitrogen; ammonium sulphate and sodium nitrate seem to be equally effective in this direction.

Mineral manures, especially potash salts, on the contrary, decrease the susceptibility to disease but cannot counteract the effects of large quantities of nitrogenous manures.

Plants which are semi-starved as regards nitrogen exhibit a considerable degree of immunity, even if the phosphates and potash are also present only in small quantities.

Lithium salts are also effective in producing immunity, while nitrates of lead and zinc, particularly the latter, render plants extremely susceptible. Other salts of lead and zinc have very little effect on the susceptibility of plants.

A variety of wheat which is almost immune to a disease (such as Little Joss to yellow rust) tends to retain its immunity even when supplied with excess of nitrogenous food material.

Increased immunity does not appear to be due to a lack of food material available for the fungus in the host, as suggested by M. Ward, because the plants rendered relatively immune by adding phosphates or potash to their food supply were as healthy and well-grown as those receiving no such additions.

It yet remains to be seen what physiological explanation can be found to account for the changes in susceptibility which can be produced in plants by the above means.—G. T. SPINKS in the "Journal of Agricultural Science."

TO KEEP ANTS AWAY.

During summer ants make their unwelcome appearance in many homes, and raid supplies of jams and preserves and other sweet concoctions. Where it is possible of distribution insectibane generally serves effectively to rout small sugar ants. To prevent them from making their way on to shelves, safes, and tables, a bulletin issued by the United States Department of Agriculture recommends soaking cotton tape an inch wide in a saturated solution of corrosive sublimate, allowing it to dry, and then fastening it around the legs of the furniture or shelves. If the tape remains dry (it is asserted) it will repel all ant invasions for months.

TO CURE HICCOUGHS.

The "Wealth of India" gives the following remarkable cure for this annoying trouble:—"Fill a glass tumbler with clear, cold water, and place on a table. Then have the patient stand where he or she can look directly into the glass, and fix the attention about the centre of the bottom of the glass for about a minute, when the patient will find the hiccoughs have entirely disappeared. This has been known to cure the most violent cases of this disorder when all other remedies have failed."

POISONING TREES.

We are constantly being asked for some method of preventing stumps from throwing out suckers, or of killing standing timber, and several suggestions have been made by our readers. Of these suggestions, the only cheap and practical methods are one in which saltpetre is placed in holes bored into the tree and plugged; and another where

arsenic and washing soda are employed. Still, neither of them appears likely to succeed in the case of dead stumps, since the destructive power of the agents used requires to be carried through trunk, roots, and branches of the living tree by means of the circulation of the sap.

A settler at Beerburrum described his success with the saltpetre method in the January issue of this Journal, and as far back as October, 1910, we published an account of the complete destruction of trees in the Tarcoom district as noted by the then Minister for Agriculture, Mr. Paget (now Minister for Railways). The success of this latter method is

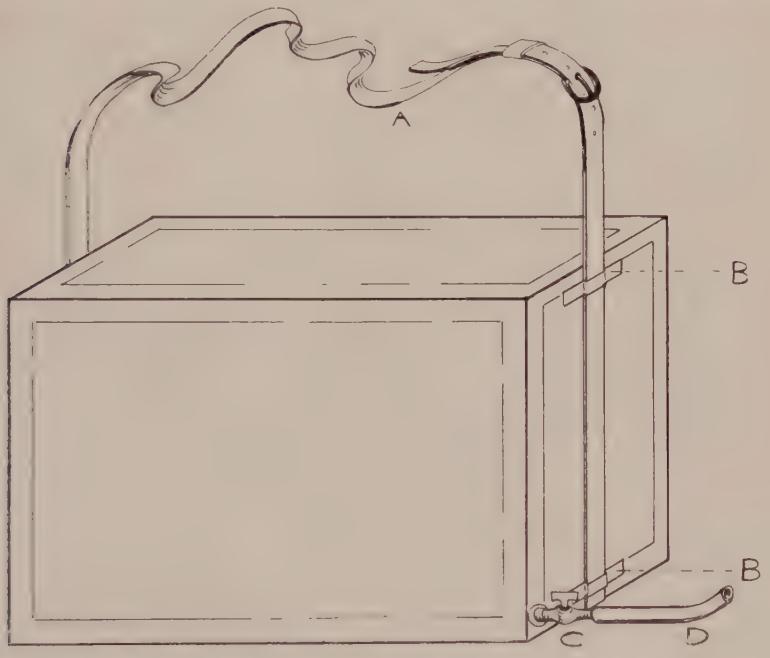


Plate 30.—Benzine Tin Adapted as a Receptacle for Arsenical Solution for Poisoning Trees.

(A) Shoulder-strap. (B) D's soldered on at each end and underneath to hold the strap firmly in position. (C) ¼-inch tap. (D) 2-ft. length of rubber hose.

further vouched for by many who have tried it. An Inglewood farmer, Mr. G. E. Burns, contributes his evidence to the "Farm Bulletin" for February, 1914, as follows:—

"Noticing a paragraph in your December issue re poisoning trees, I have tried the arsenic and soda method. I poisoned about 10 acres about two years ago in a dry time, but the biggest part of them suckered, but they burnt off very well. I poisoned 5 acres of big ironbark trees twelve months ago, after a good fall of rain, and they all died right out. I rung as close to the ground as possible, and bought the arsenic by the pound in tins, as the bulk arsenic isn't pure. I used 3 lb. arsenic to 7 lb. washing soda to 5 gallons of water. My advice to those about to poison trees is to see that the arsenic is pure and the sap is running well in the

trees, and ring low. I might say the addition of saltpetre is a great help for burning off."

Mr. Quodling, Inspector of Agriculture, supplies the accompanying sketch of a handy receptacle for the arsenical solution for poisoning trees, made of a benzine tin. The tin is dented in so that it rests comfortably on the hip. It is necessary to cut a hole temporarily on the top of the tin to allow of fixing the tap in position, after which the hole is re-

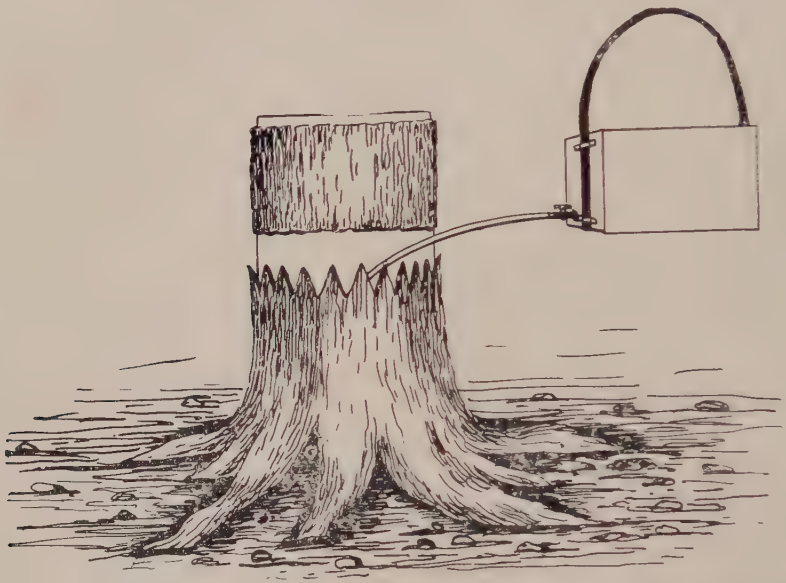


PLATE 31.—METHOD OF "FRILL-RINGING" A TREE AND APPLYING THE POISON.

soldered. Filling is effected through the ordinary screw-cap, a funnel being inserted. The arsenical solution is injurious to the hands, which should therefore be protected by wearing a glove on the hand used for directing the hose length.

1. Shoulder-straps. 2. D's soldered on at each end and underneath to hold the strap firmly in position. 3. $\frac{1}{4}$-in. tap. 4. Length of rubber hose.

Answers to Correspondents.

SELECTING SEED CORN.

"CORNGROWER," Manyung—

If your farm is in proximity to others where a different type, or a more uniform class of maize is grown, there will be difficulty in keeping up your standard. There is always satisfaction in knowing that seed carefully selected with due regard to the maintenance of "quality" will give more satisfactory results than the average seed maize retailed as such. When diminished yield and signs of deterioration are noticeable in your field and in the maize itself, it is time to effect a change. On the other hand, if you have worked up a good standard type of grain, and it suits your soil and conditions, there is no reason to bring seed from an outside source, unless you are satisfied as to its being an improvement on your own. Seed selection is an important factor in the improvement of any grain, and if the methods of selection, as directed in the pamphlet sent to you from this Department, are carefully followed, you may expect considerable improvement. A writer in one of our exchanges says, on the subject:—

"The power of heredity in corn is more marked than in any other plant. Strong, healthy, purebred seed produces its kind, and weak, emaciated seed of poor heredity is reflected in the harvest. Inbred corn produces defective and deformed ears. Corn fertilised by pollen from barren stalks is apt to yield barren stalks. The hereditary tendency is so sensitive that the location of the ear on the stalk is transmitted.

"It has been demonstrated that corn planted from ears located near the ground will mature from ten to fifteen days earlier than those high on the stalk.

"It should be remembered that a kernel should possess vitality strong enough to give out roots and push a stem far enough above ground to receive carbon dioxide from the air before the roots can take plant food from the soil. A rapid growth at the beginning is pronounced throughout the entire life of the plant. Primarily, the seed should be of a strain adapted to the locality, and the seed should be from the locality where it is planted. Corn grown in a humid climate may not do well in a semi-arid section. Corn can, however, become acclimatised in two or three or three years. Again, inbred seed corn, or corn that has been fertilised from barren or scrubby stalks, should not be planted."

LUCERNE.

"LUCERNE," Mondure Estate, Wondai—

Quantities of lucerne seed have been imported at times from European sources, and it seems likely that some of the crops raised from this seed may be found growing on the Downs. The strain known as

Hunter River Broad Leaf Lucerne is regarded as the most suitable for Queensland conditions, and is more largely grown than any other kind. It may be noted that there are several different strains of lucerne. The "Turkestan" is a narrow-leafed variety, of which seed was introduced on the Downs, as it was said to be drought and heat resistent, but it did not prove more so than others. The variety known as "Peruvian," on the other hand, is broader and larger in the leaf, and varies slightly from the Hunter River type. It is said to be suitable as a winter crop, but this feature has not yet been satisfactorily proved.

INOCULATING THE SOIL FOR LUCERNE-SEED MAIZE.

H. BOYLE, Goondoon—

1. *Re* inoculating scrub soils: This may not be required, but the resulting crop will be a guide in this respect. If found to be required later on, soil should be procured from successful lucerne fields, and applied simultaneously with the seed, the soil being previously sifted and put through the fertiliser box at the rate of from 300 to 500 lb. per acre, or else broadcasted.

2. March and April are the best months to sow. Good crops of lucerne have been raised on the Downs (a colder district than yours in a favourable winter), but the young lucerne must be inured to cold and light frost from the start. If it reaches the rough leaf or more forward stage in a sappy condition without experiencing any frost, then there is no danger from the expansive action of the water freezing in the plant cells.

3. *Re* number of small cobs on stalk, &c.: This is an abnormal condition which may be due to an inherent defect in the "strain" of maize you imported, or else it has been brought about by some untoward circumstance which happened during the growth of the crop. When acclimatised, the maize may improve in this respect, but in the face of its present showing it would be inadvisable to save a large quantity for seed purposes. In selecting seed, it is better to adopt the recognised lines for selection laid down in the accompanying "Maize Pamphlet," and reject stalks showing an abnormal number of poorly developed ears.

4. *Re* breaking off cobs: See reply to No. 3. For obvious reasons there is little to be expected from this process of seed selection.

5. Ordinarily, a plant showing two well-developed ears is preferable; but, if there is any tendency towards degeneration in size and type, the stalk carrying a single ear would be preferable. Consideration should be given and judgment exercised in regard to the kind of season experienced during the growth and development of the crop.

TANGERINES.

Our correspondent's letter has been mislaid. We are informed that Tangerines, up to 500, can be obtained from Mr. J. Williams, Sunnybank Nursery, Sunnybank, Brisbane.

RISE AND FALL OF SAP IN TREES.

A.H., Mooloolah—

The best season for ring-barking is generally considered to be that during which the flow of the sap is most active, and growth is taking place. Generally speaking, for the Mooloolah District, this would be in February and March, but this season it is later. Sap does not fall in the ordinary sense, though it may remain stationery during the season when no growth is taking place.

Suckering.—It is said that suckering may be prevented by "Frill-ringing—*i.e.*, not taking the chip out of the trunk—and pouring in an arsenical poison, as described and illustrated in this issue of the Journal.

HOME-CURED BACON.

"YARWUN," Yarwun—

In reply to your request for information on the best means to cure bacon and hams, so as to avoid the drying and hardening of the fleshy parts, Mr. J. Brown, Principal of the Queensland Agricultural College, advises as follows:—

"The method outlined by your correspondent is good, but the sides should not be treated for longer than a fortnight, if mild-cured bacon is required for immediate consumption. After 10 to 14 days in the salt, &c., they should be well washed in lukewarm water and removed to a cool, dry place.

"The hardness, dryness, and extreme saltness of the lean of bacon is caused in this way: The principle underlying the process of curing is one of osmotic* diffusion through the animal membranes. The soluble albuminoids in the meat diffuse outwards, and the pickle inwards, until only hard insoluble fibrinoids remain. On the latter, both salt and saltpetre have a hardening effect. Where a good deal of sugar is used, it is less noticeable, but sugar can only be used freely in cold weather, or it sets up decomposition changes. In summer curing the pickle must be strong, to ensure thorough penetration, otherwise bad, discoloured meat will result in the inside portion. In home-curing, the difficulty can only be overcome by selecting rather fat pigs, using mild pickle with sugar, restricting the curing period, curing only in winter, and consuming without delay."

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* Osmotic pressure may be thus described:—Let a solution and a solvent be separated by a permeable partition which permits the passage of the solvent but not of the dissolved substance. The solvent will pass through it until it exerts equal pressure on both sides of the partition; the total pressure exerted by the solution will then exceed that exerted by the solvent by an amount equal to that exerted by the dissolved substance alone. This amount is called the "Osmotic Pressure" of the dissolved substance.

The process of Osmosis is this: Let a solution of copper sulphate in water be separated by pure water by a partition consisting of a sheet of parchment; the water will pass through in one direction, and the dissolved substance in the other, as above described by Mr. Brown, in the case of the curing pickle.—[Ed. "Q.A.J."]

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR FEBRUARY, 1914.

Article.		FEBRUARY. Prices.
Bacon (Pineapple)	lb.	7½d. to 10½d.
Bran	ton	£5 5s.
Butter	cwt.	104s.
Chaff, Mixed	ton	£5
Chaff, Oaten (Victorian)	„	£6 to £7
Chaff, Lucerne	„	£5 5s. to £7 10s.
Chaff, Wheaten	„	£4 to £4 10s.
Cheese	lb.	6d. to 6½d.
Flour	ton	£9
Hams	lb.	1s. 2d.
Hay, Oaten (Victorian)	ton	£6 to £6 10s.
Hay, Lucerne (Prime)	„	£3 10s. to £4 15s.
Honey	lb.	1¾d. to 2¼d.
Maize	bush.	4s. 2d. to 4s. 3d.
Oats	„	3s. 9d. to 4s. 6d.
Onions	ton	£7 to £10
Pollard	„	£5 5s.
Potatoes	„	£6 10s. to £10 10s.
Potatoes (Sweet)	cwt.	4s. to 4s. 3d.
Pumpkins	ton	£4 10s. to £5 15s.
Wheat, Milling	bush.	3s. 7d.
Eggs	doz.	8d. to 1s. 7d.
Fowls	pair	2s. to 4s.
Geese	„	4s 9d. to 5s. 6d.
Ducks, English	„	2s. to 2s. 6d.
Ducks, Muscovy	„	4s. to 5s.
Turkeys (Hens)	„	7s. 6d. to 8s.
Turkeys (Gobblers)	„	12s. to 16s.

SOUTHERN FRUIT MARKETS.

Article.	FEBRUARY. Prices.
Bananas (Fiji), G.M., per case	14s. to 15s.
Bananas (Fiji), per bunch	4s. 6d. to 13s.
Bananas (Queensland), per case	6s. to 10s.
Mangoes, per bushel-case	3s. to 10s.
Passion Fruit, per half-case	4s. to 7s.
Pineapples (Queensland), (common), per case	5s. to 6s.
Pineapples (Queensland), (Ripleys), per case	5s. to 6s.
Pineapples (Queens), per case	6s. to 7s.
Tomatoes, per quarter-case	1s. 6d. to 3s.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	FEBRUARY. Prices.
Apples, Eating (American), per case	8s. to 13s.
Apples, Eating (Stanthorpe), per case	6s. to 8s.
Apples, Cooking (Victorian), per case	6s. to 7s.
Apples, Cooking (Stanthorpe), per case	4s. 6d. to 6s.
Apricots, per quarter-case	...
Bananas (Cavendish), per dozen	1½d. to 3d.
Bananas (Sugar), per dozen	1¾d. to 2¾d.
Cape Gooseberries, per quarter-case	...
Cherries (Local), per quarter-case	...
Citrons, per cwt.	...
Cocoanuts, per sack	13s. to 14s.
Custard Apples, per case	...
Figs, per box	6s. to 8s. 6d.
Grapes (Local), per pound	2d. to 6d.
Lemons (Local), per case	6s. to 8s.
Lemons (Italian), 150 Fruits, per half-box	14s.
Limes, per case	...
Mandarins, per case	...
Mangoes, per case	9d. to 1s. 6d.
Nectarines, per quarter-case	1s. to 4s.
Oranges (Italian), per case	10s. to 12s.
Oranges (other), per case	...
Papaw Apples, per quarter-case	2s. to 3s.
Passion Fruit, per case	4s. to 6s.
Peaches, per quarter-case	2s. to 5s.
Pears, per bushel-case	9s.
Persimmons, per case	1s. 6d. to 2s.
Pineapples (Ripley), per dozen	1s. to 1s. 6d.
Pineapples (Rough), per dozen	1s.
Pineapples (Smooth), per dozen	1s. to 2s.
Plums, per quarter-case	2s. to 3s.
Rockmelons, per dozen	1s. to 4s. 3d.
Strawberries, per dozen pints	...
Tomatoes, per quarter-case	1s. 6d. to 3s. 6d.
Watermelons, per dozen	2s. to 8s.

TOP PRICES, ENOGGERA YARDS, JANUARY, 1914.

Animal.	JANUARY. Prices.
Bullocks	£13 to £16
Cows	£7 12s. 6d. to £9 12s. 6d.
Merino Wethers	24s. 3d.
Crossbred Wethers	24s. 3d.
Merino Ewes	17s. 6d.
Crossbred Ewes	20s.
Lambs	17s. 3d.
Pigs (Porkers)	...

PRODUCE MARKETS.

Fenwick and Co., salesmen, Brisbane, report under date 16th February:—

Hides.—Only fair supplies were offered, the total number catalogued being 5,499. Competition ruled keen for all descriptions at values equal to the best of last sale's rates. Stout hides sold exceptionally well, and we topped the market at 13d. secured for two hides. Also 350 picked heavy hides were sold from 10d. to 12⅞d. We sold 2,254.

Calfskins and Yearlings.—Both descriptions were in good demand at about late rates. Best calfskins sold at 11½d. per lb., and yearlings to 7½d. Well flayed small calfskins realised to 10½d. per lb.; large, 7½d. to 8½d. per lb.; faulty, 6d. to 7½d. per lb.; cuts, 6d. to 9d. per lb.; damaged, faulty and soakers, 1s. to 2s. 3d. each. Dry salted skins, best, 3s. 3d. to 3s. 6d.; seconds and cut, 1s. 6d. to 2s. 6d.; sundried, best, to 2s. 6d.; cut, 2s. Yearlings, ordinary and cut, 6½d. to 7d.; faulty and rough, 5½d. to 6d. per lb. We sold 1,478.

Sheepskins.—All descriptions were in good demand, and though the market at times was irregular values were practically unchanged. Full wool merinos, light condition, 7¾d. to 8d. per lb; short woolled merinos, light condition, 6¼d. per lb.; pelts and very short wools, 4½d. to 5¾d.; crossbreds, fine full, to 7½d. per lb.; crossbreds, three-quarter woolled, 6d. to 6¾d., according to quality; pelts, 3¾d. to 4½d. We sold 3,756.

Tallow.—Although prime tallow was in good demand, values declined 10s, top price being £29. Second grades were fully 15s. to 20s. per ton lower. We sold 64 tierces and 6 quarter-casks.

Marsupial Skins.—Only small catalogues were submitted, but a keen demand prevailed, and values were very firm. Scrub wallabies showed a slight advance and realised 2s. 6d. to 4s. 6d. per dozen for small skins, 7s. to 9s. 9d. for medium, and 12s. to 18s. 6d. for large skins. Swamp wallabies realised from 1s. to 12s. per dozen, according to size. Rock wallabies and padda-melons sold from 2s. to 6s. per dozen. Coast wallabies realised 1s. 9d. per lb. for sound skins averaging over 5 lb. per dozen, and 1s. 5d. for seconds; while sound large scrubs made to 1s. 11d. for firsts and 1s. 9d. for seconds. Kangaroos, wallaroos, and whiptails realised late rates; while goatskins showed a decided advance. We sold 7,102. Red kangaroos, 1st large and medium size, made 2s. 6d. to 2s. 10d. per lb.; under 6 lb. and over 24 lb., average to 2s. 5d.; seconds are worth from 2s. to 2s. 6d. per lb. Wallaroos, first, 1s. 6d. to 1s. 9d. per lb.; seconds, 1s. 3d. to 1s. 6d. per lb., according to weight. Whiptails, first, over 5 lb. average, are selling at 1s. 11d. per lb.; and seconds to 1s. 9d. per lb. Goatskins, first quality, averaging from 10 to 20 lb., to 1s. 9d. per lb.; over 20 lb., 1s. 2d. to 1s. 7d. per lb.; seconds are worth 1s. to 1s. 2d. per lb.

Orchard Notes for April.

THE SOUTHERN COAST DISTRICTS.

The gathering and marketing of citrus fruit, as well as of pines, bananas, custard apples, persimmons, &c., is the principal work of the month. In the Notes for March attention was drawn to the necessity for keeping all pests in check, particularly those attacking the ripening fruit. As it is the height of folly to look after the orchard thoroughly during the growing period of the crop and then to neglect the crop when grown, every possible care must be taken to keep fruit fly, peach moth, black brand, or other pests that destroy or disfigure the fruit in check, and this can only be accomplished by combined and systematic action. Citrus fruit at this time of the year often carries badly, as the stem is tender, easily bruised, full of moisture, and, consequently, very liable to the attacks of the blue mould fungus, which causes specking. The loss from this cause can be lessened to a considerable extent by carefully attending to the following particulars:—

1st. Never allow mouldy fruit to hang on the trees or to lie about on the ground. It should be gathered and destroyed, so that the countless spores which are produced by the fungus shall not be distributed broadcast throughout the orchard, infesting many fruit, and only waiting for a favourable opportunity, such as an injury to the skin by an insect or otherwise, combined with favourable weather conditions (heat and moisture), to start into growth.

2nd. Handle the fruit carefully to prevent bruising. Cut the fruit, don't pull it, as pulling is apt to plug the fruit—that is to say, to either pull the stem out or injure the skin round the stem—and a fruit so injured will go mouldy.

3rd. Sweat or dry the fruit thoroughly; if the weather is humid, laying the fruit out in the sun on boards or slabs is a very good plan.

4th. After sweating, examine the fruit carefully, and cull out all bruised or punctured fruit, and only pack perfectly sound dry fruit. It is better for the loss to take place in the orchard than for the loss to take place in the case in transit.

5th. If the mould is very bad, try dipping the fruit for a few seconds in a 2 per cent. solution of formalin. This will kill the spores, and if the fruit is placed in the sun and dried quickly before packing there will not be much chance of its becoming reinfested.

Don't gather the fruit too green, especially such varieties as the Beauty of Glen Retreat Mandarins, as immature fruit spoils the sale of the good article.

If the orchard has not been cleaned up after the summer rains, do so now; and do any other odd jobs that may be required, such as mending fences, grubbing out dead or worthless trees, cleaning out drains, &c.

Strawberry planting may be continued, and where new orchards are to be planted continue to work the soil so as to get it into the best possible tilth.

THE TROPICAL COAST DISTRICTS.

Clean up the orchards after the rainy season. Look out for scale insects, and cyanide or spray for same when necessary.

Go over the trees carefully, and when there is dead wood or water sprouts remove them. If bark fungus is showing, paint the affected branches with sulphur and lime wash. Clean up bananas, pineapples, and other fruits, as after the end of the month it is probable that there will not be any great rainfall, so that it is advisable to keep the ground well cultivated and free from weeds, so as to retain in the soil the moisture required for the trees' use during the winter months. Keep bananas netted; destroy guavas wherever found.

THE SOUTHERN AND CENTRAL TABLELANDS.

If the orchards and vineyards have not already been cleaned up, do so. Cultivate or plough the orchard, so as to get the surface soil into good tilth, so that it can absorb and retain any rain that falls, as, even though the trees will simply be hardening off their summer's growth of wood, it is not advisable to let the ground dry out. When citrus fruits are grown, attend to them in the manner recommended for the Southern Coast Districts; and when grown in the dry parts, keep the land in a state of good cultivation. Should the trees require it, a light watering may be given. Do not irrigate vines; let them ripen off their wood.

Farm and Garden Notes for April.

Field.—The wheat land should now be ready for sowing the early wheats, and that which has not been prepared should be ploughed without delay. April, May, and June at latest being the months for sowing. The main potato crop, planted in February and March, will now be ready for a first or second hilling up. The last of the maize crop will now have been got in. Where cotton is grown, the pods will now be opening, and advantage should be taken of dry weather to get on with the picking as quickly as possible. Picking should not be begun until the night dew has evaporated nor during rain. Sorghum seed will be ripe. Tobacco also will be ripening, and either the leaves or the whole plant harvested. Lucerne may be sown, as the growth of weeds has now slacked off, but the ground must be thoroughly prepared and cleaned. Sow oats, barley, rye, wheat, mangolds, and Swede turnips. Plant out paspalum roots. Seed wheat of whatever variety soever should be dipped in a solution of sulphate of copper (bluestone) in the proportion of 1 lb. of sulphate to 24 gallons of water. The seed may also be treated with hot water by plunging it in a bag into hot water at 120 degrees Fahr. for a minute or two, and then into water heated to 135 degrees Fahr. Allow it to remain in this for ten minutes, moving it about all the time. Then plunge the seed into cold water and spread out to dry. This plan is useful in districts where bluestone may not be obtainable. Another safeguard against bunt, smut, black and red rust is to treat the seed with formalin at the rate of 1 lb. of formalin to 40 gallons of water. Schering's formalin costs about 2s. 10d. per lb., and is sold in bottles. It is colourless and poisonous, and should be kept where no children or persons ignorant of its nature can have a chance of obtaining it. To treat the seed, spread it on a wooden floor and sprinkle the solution over it, turning the grain over and over until the whole is thoroughly wetted. Then spread it out to dry, when it will be ready for sowing. Instead of sprinkling, dipping may be resorted to. A bushel or so of seed is placed in a bag and dipped in the solution. During five minutes the bag is plunged in and out, and then the seed is turned out to dry. Formalin is less injurious to the grain than bluestone, but, while the latter can be used over and over again, formalin becomes exhausted. It therefore follows that only the amount required for immediate use for sprinkling should be prepared. Do not sow wheat too thickly. Half a bushel to the acre is sufficient—more on poor land and less on rich soils. On light sandy soil the wheat should be rolled. On sticky land it should only be rolled when the land is dry, otherwise it will cake, and must be harrowed again after rolling. When the wheat is 6 in. high go over it with light harrows. If the autumn and winter should prove mild and the wheat should lodge, it should be kept in check by feeding it off with sheep.

KITCHEN GARDEN.—Hoe continually among the crops to keep them clean, and have beds well dug and manured, as recommended last month, for transplanting the various vegetables now coming on. Thin out all crops which are overcrowded. Divide and plant out pot-herbs, giving a little water if required till established. Sow broad beans, peas, onions, radish, mustard and cress, and all vegetable seeds generally except cucumbers, marrows, and pumpkins. Early celery should be earthed up in dry weather, taking care that no soil gets between the leaves. Transplant cauliflowers and cabbages, and keep on hand a supply of tobacco waste, preferably in the form of powder. A ring of this round the plants will effectually keep off slugs.

FLOWER GARDEN.—The operations this month will depend greatly on the weather. If wet, both planting and transplanting may be done at the same time. Camellias, gardenias, &c., may be removed with safety. Plant out all soft-wooded plants such as verbenas, petunias, penstemons, &c. Sow annuals, as carnations, pansy, mignonette, daisy, snapdragon, dianthus, stocks, candytuft, phlox, sweet peas, &c. Those already up must be pricked out into other beds or into their permanent positions. Growth just now will not be too luxuriant, and shrubs and creepers may be shortened back. Always dig the flower beds rough at first, then apply manure, dig it in, and after this get the soil into fine tilth. Land on which you wish to raise really fine flowers should have a dressing of bonedust lightly turned in. Wood ashes also form an excellent dressing for the garden soil. Prune out roses. These may be planted out now with perfect success. Take up dahlia roots, and plant bulbs as recommended for March. Layers that have made sufficient roots should now be gradually severed from the plant, and left for a fortnight before potting, to ripen the young roots.

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